Telephony.

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Exchange of the Painesville Ohio Telephone Company.

In the early days of the Independent movement for more modern and better telephone service, a number of business men of Painesville, Ohio, held a meeting to consider the advisability of building an exchange in opposition to the Bell who was then serving about one hundred and ten subscribers in Painesville and giving very poor service. The

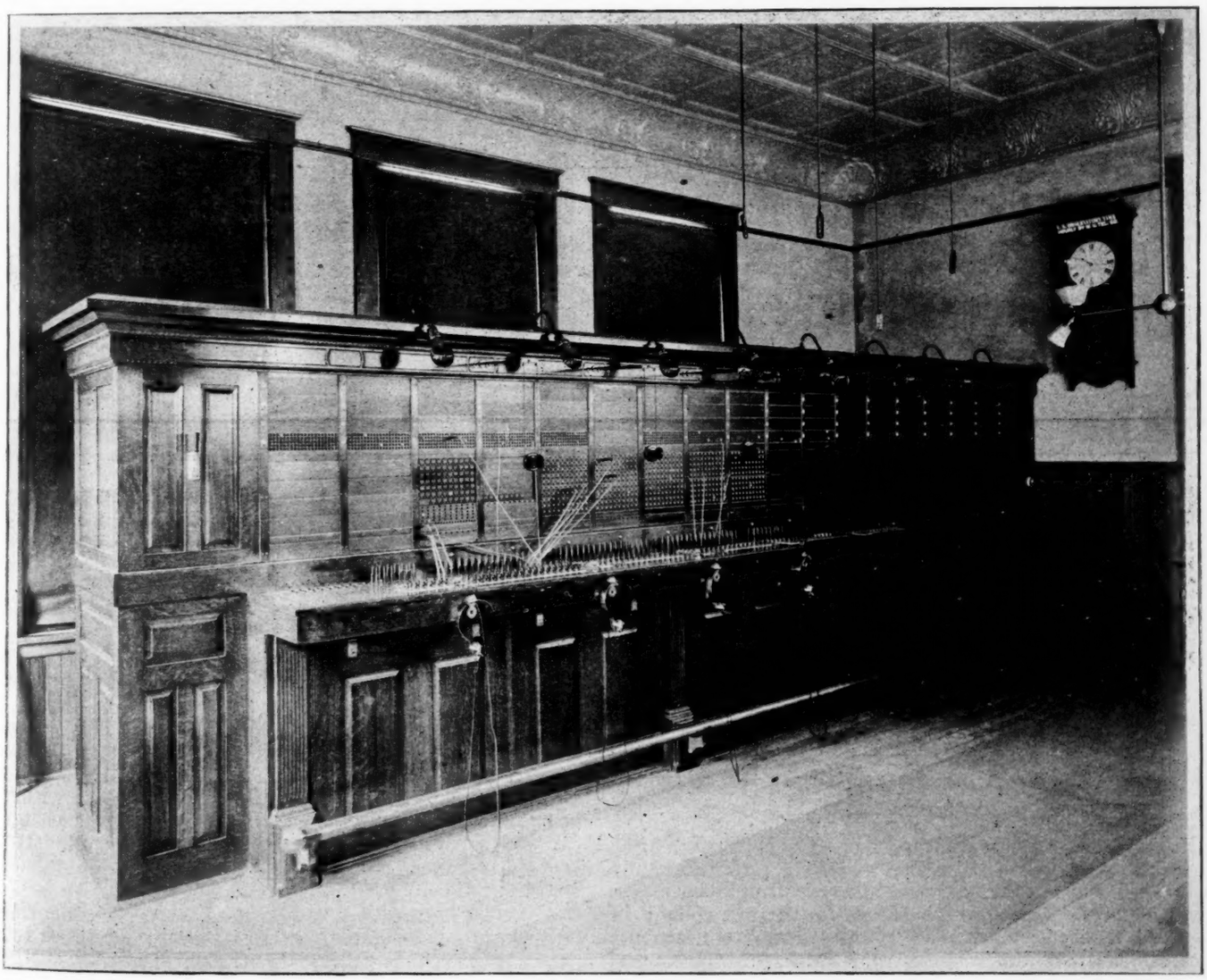


FIG. I.—MAIN SWITCHBOARD, PAINESVILLE TELEPHONE EXCHANGE.

result of this meeting was the organization of the Painesville Telephone Company in 1894, with eight stockholders. The company when starting hoped to be able to secure as large a list of subscribers as the Bell company then had, but instead of one hundred and ten, the company secured two hundred and ten subscribers, which list has constantly grown since then, until it now numbers nearly seven hundred. The

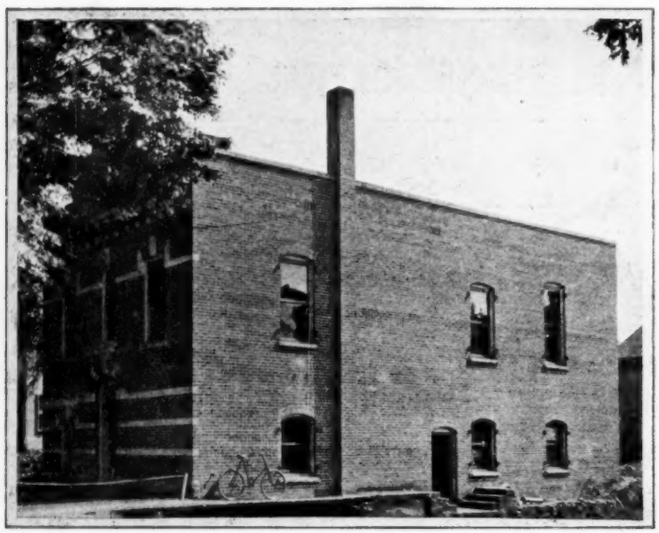


FIG. 2.—PAINESVILLE TELEPHONE EXCHANGE BUILDING.

Bell list in the same time has only increased to two hundred and thirty. The experience of the Painesville Telephone Company has been similar to a great many other Independent operating companies in the matter of re-equipping. It has been compelled to rebuild its entire system three different times.

The last equipment installed is modern in every particular and in all probability will not have to be replaced for a good

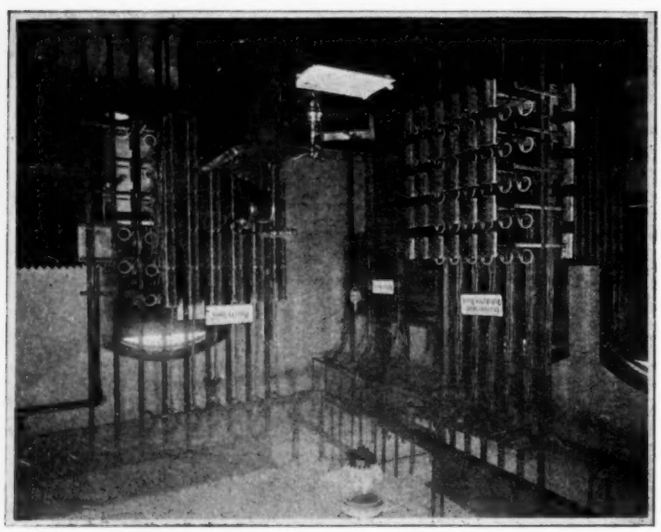


FIG. 3.—TERMINAL ROOM, PAINESVILLE TELEPHONE EXCHANGE.

many years. It was manufactured by the North Electric Company of Cleveland, Ohio, who have furnished equipment for some of the most prominent telephone companies in the country. The apparatus furnished the Painesville Telephone Company consists of an entirely new central office equipment, together with all subscribers' instruments and auxiliary apparatus.

The manager of the Painesville exchange is E. L. House, who is widely known in the telephone field and who has devoted a number of years to the study of the economic management of modern telephone exchanges. He is assisted by C. M. Grauel, the company's electrician.

The exchange has steadily grown under the management of Mr. House. Some time since he brought the matter of new quarters and new equipment up before the company's board of directors and it was decided to erect a new building for the exclusive home of the exchange. This building, which is modern in every particular, is shown in Fig. 2., and houses one of the most modern exchanges in the state.

The main switchboard, which has a capacity for twenty-four hundred local lines, is equipped with six hundred local lamp signal line equipment, and fifty line equipment for magneto or rural lines. In addition to this are the automatic trunking circuits which connect the main exchange with the branch at Fairport (on the lake), which sub-exchange is

FIG. 4.—TERMINAL ROOM, PAINESVILLE TELEPHONE EXCHANGE.

equipped with a one-hundred line switchboard. The switchboard is equipped with selective signal party line keys, as party line service has become a feature with the Painesville Telephone Company.

The terminal and power room, shown in Figs. 3, 4 and 5, is equipped with a three panel marble power board, with Weston meters, I. T. E. circuit breakers, rheostats, knife switches of ample size, together with a fuse panel, all wiring being brought direct to the main power board. The charging and ringing machines are installed upon a tile-faced pedestal, the latter being built directly up from the ground through the floor.

A unique feature of the power plant is the current equalizer which will be noticed in Fig. 5, standing between the power board and the pedestal upon which are located charging and ringing machines. This equalizer is used to give an equal imput of power received from the mains of the inter-

urban street railway system which has a great fluctuation in current.

The protectors, relays, and terminal blocks for the intermediate distributing board are all mounted on thoroughly and substantially constructed iron racks, extending from the floor to the ceiling. Particular attention has been paid to the laying out of the terminal apparatus, every facility being afforded for quick and economical testing without sacrificing

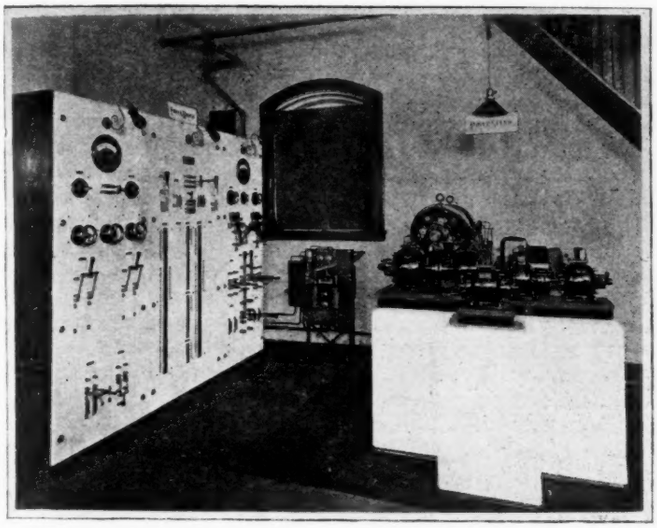
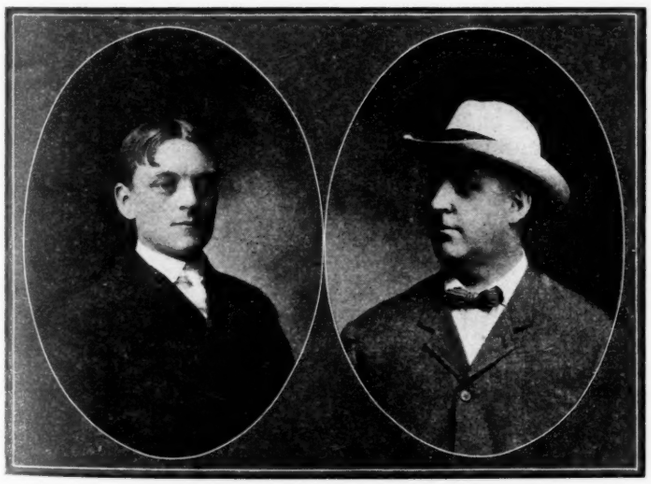


FIG. 5.—POWER PLANT, PAINESVILLE TELEPHONE EXCHANGE.

neatness and thoroughness in the installation work. Special attention is called to the cabling, as shown in Figs. 3 and 4, as well as to the general arrangement of the terminal room equipment. Fig. 7 shows the arrangement of the power plant apparatus, with the exception of the storage batteries, which are located in duplicate in a separate room immediately in the rear of the power board.

Remarkably quick service is being furnished at this exchange, the average being less than three seconds per call, credit for which is due to the character of apparatus used,



C. M. GRAUEL, ELECTRICIAN. E. L. HOUSE, MANAGER.

and the competency of the company's electrician, C. M. Grauel, who has active charge of the plant. The exchange is equipped with toll board, chief operator's desk, wire chief's desk, and every other auxiliary equipment which would tend to facilitate the handling of its business.

The operators have separate retiring and recreation rooms, lavatories, lockers, etc. The workmen are furnished with special quarters on the lower floor, including lockers, lavatories, etc.

The exchange is creditable both to the North Electric Company of Cleveland, who designed and installed the apparatus, and to the Painesville Telephone Company, who furnish modern telephone service to six hundred and eight subscribers. The company recently introduced the party line and measured service and find it has very materially increased the rental receipts. Progressive management is bringing this exchange rapidly to the front, and it is safe to predict a bright future for the Painesville Telephone Company.

TELEPHONES IN RESTAURANTS.

The following story from New York on the use of telephones in restaurants shows that the eastern metropolis is just adopting the restaurant telephone, which has been in use in Chicago for a long time. New York learns many things from its sister city Chicago which is the telephone center and where nearly all telephonic innovations originate. The story follows:

A man accompanied by two women entered an uptown restaurant and sat down at a table near the wall, toward the rear of the room. After the man had given his order to the waiter he added:

"Oh, yes; and bring me a telephone."

"A telephone?" repeated one of the women. "How can you eat a telephone?"

"It's the latest wrinkle," responded the man. "Wait and you will see."

Sure enough the waiter returned in a few minutes with a desk telephone and several yards of silken electric cord. The telephone was placed on the dinner table, and the waiter then attached the silken cord to a socket in the side wall.

The man of the party picked up the receiver, moved the telephone into a convenient position and then asked central to give him the box office of a Broadway theater. After ordering three seats for the performance that night he asked the women with him if they had any message they wished to send to any one.

One of the women telephoned to her hotel about some rings she had mislaid, and the other telephoned to a friend relative to a shopping engagement for the next day. By the time they had finished with the telephone the waiter had returned with the dinner. Before serving it he disconnected the silken cord from the wall socket and carried the telephone away.

"These portable telephones," said the head waiter of the restaurant, "are novelties which are fast becoming popular. We have just introduced them here.

"Each table is so arranged that there is a socket handy to which we can attach a portable telephone. The wires all lead to a private branch telephone exchange which we maintain in an upper room. Each wire and socket has a number, and a guest at a table can arrange to have a friend call him up on the telephone while he is at dinner.

Poor telephone girls; they are never allowed to rest in peace for long. The Stockholm telephone authorities are finding fault now with the way in which they do their hair. It appears that of late the Swedish lassies who put you through to the number you ask for—or otherwise—have adopted the mode of coiffure first initiated by the French dancer Cléo de Merode, in which the hair is drawn down over the ears. The subscribers have since found a falling off in the hearing powers of the operators, as the result of which complaints of inefficiency in the service have been made, and the girls ordered to change their style of hair-dressing. This they have refused to do, and there seems a prospect of another labor crisis in Stockholm.

Arrangement of Terminal Apparatus in Central Offices

KEMPSTER B. MILLER

There is still some controversy in regard to the best method of arranging the cables and line terminal apparatus between the cable entrances and the switchboard apparatus in central offices. Two general methods are now in vogue, either of which is subject to many modifications. One of these consists in terminating the street cables in pot-heads or their equivalents, and running directly from these to line clips on the main distributing frame, the switchboard side of this frame carrying the arresters, from which the various cables run to the relay rack and intermediate distributing frame, and thence to the switchboard proper. The other method is to terminate the cables in iron terminal heads placed on a separate rack, these terminal heads carrying the arresters, from which cables then run to the main distributing frame and thence to the intermediate frame and relay rack, and to the switchboard.

The former method, that is of terminating the street cables in pot-heads or equivalent devices and of placing the arresters on the switchboard side of the main distributing frame, is growing in favor and has been almost universally the practice of most of the Bell operating companies, as well as many of the Independent companies. Some of the advantages of this method may be outlined as follows:

First, it brings about a considerable saving of expense over the construction using the iron terminal heads, principally because the number of arresters provided need be approximately equal only to the number of lines in use on the switchboard, where the pot-head construction is used; rather than equal to the number of cable pairs in the street cables, as may be required where the iron terminals are used. The number of pairs in the outside cables is usually greatly in excess of the actual working capacity of the switchboard, and the providing of an arrester for every pair in the street cables involves a considerably greater investment than would be required where the smaller number of arresters was needed. Furthermore, the price of the iron cable heads with arresters is considerably more than the price of the arresters without the heads, and there is an additional cost in the rack upon which the iron terminals are to be mounted, as well as in the additional amount of wiring and soldering to be done where the iron terminals are used. This additional wiring and soldering is brought about by the fact that cables must be led to the iron arresters to which they are soldered, and other cables led from the arresters to the line side of the distributing frame; whereas, in the case where the iron terminals are not used, the cabling is carried directly, without a break, from the street cables to the line side of the main switchboard.

Second, the method using pot-heads requires less valuable floor space than the other, no cable terminal rack being required.

Third, it is more convenient to associate the arrester with the switchboard line than it is to associate it with the outside line. When the arrester is mounted directly on the switchboard side of the main distributing frame it may be said to become a part of the line circuit of the switchboard, and in the exchange is associated definitely with the particular line and cut-off relay, as well as certain other portions of the apparatus on the main switchboard. When, however, the arrester is mounted on a separate cable head outside of the main distributing frame, it becomes more properly a part of the line equipment, inasmuch as any arrester must then always be associated with any particular line. Inasmuch as the arrester is a part of the central office apparatus, it seems better to consider it as belonging to a certain switchboard line rather than to an outside line. This is particularly true in case of trouble needing quick action, for, when the arrester is mounted on the switchboard side of the distributing frame, no jumper list need be consulted to get at the arrester belonging to any switchboard line.

Fourth, the iron cables are supposed to hermetically seal the lead-covered cables entering the office. They are frequently not moisture-proof, however, and are liable to be left open at any time by workmen. Furthermore, the interior arrangement of the conductors in these heads whereby the wires in the cables are attached to the wires in the switchboard cable, is always extremely awkward, because it is necessarily crowded. Pot-heads, when properly made, afford a much better protection to the cable insulation than can with certainty be afforded with the iron cable heads. These latter are always necessarily punctured full of holes through which the terminals must pass, and therefore depend for their air-tight condition upon the successful plugging of these holes with the rubber insulation.

On the other hand, there are several features which may be cited as disadvantages in connection with the practice of terminating the cables in pot-heads or equivalent devices and carrying the arresters on the main distributing frame.

There is a considerable amount of soldering always necessary at the distributing frames due to the constant changes of the jumper wires. From this viewpoint the placing of the arresters on the distributing frame is disadvantageous in that drops of solder are likely to fall down through the arrester strips and short-circuit some of the springs or connectors. The arresters are necessarily closely bunched, and a drop of solder falling through them may introduce several cases of trouble in different lines. This is not as likely to happen where the arresters are mounted on the outside of cast-iron terminal boxes, because in this case most or all of the soldering is necessarily done on the inside of these boxes.

Another disadvantage often pointed out by advocates of the iron terminal head is that when the arresters are mounted on the switchboard side of the distributing frame no protection is afforded for the line side of the distributing frame or for the jumper wires. This, in the old methods of construction where beeswaxed or paraffined jumper wires were used, and where the distributing frame was built largely of wood, was a very serious drawback. Now, however, it is of less importance, because the use of flame-proof jumper wire and structural iron frameworks has rendered the liability to damage by fire in the distributing frame itself very slight.

This brings us logically to still another method of construction which in some circles is growing in favor. In this pot-heads or some equivalents are used for protecting the outside cable insulation, and the cables from these are terminated in arresters on a separate arrester frame. In this case the arresters are mounted on iron bars and are entirely open, as when mounted on the distributing frame. From the arresters the cables then lead to the line side of the distributing frame. The switchboard side of the distributing frame in this case consists only of ordinary clips for connecting the cables leading to the intermediate and relay racks and the switchboard.

By this construction protection is afforded to the whole of the main distributing frame and the cables leading to it, as in the case where the arresters are mounted on iron ter-

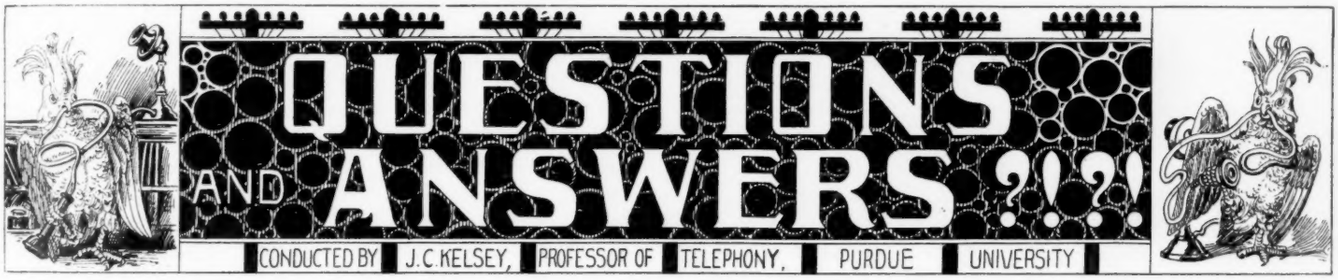
minal heads. Also the advantages concerning the use of solder are secured. The running of the jumper wires on the main distributing frame is made somewhat more convenient, because of the absence of the arrester strips, which are often of such nature as to somewhat crowd the work of soldering the jumper wires.

Of course, this latter method has the disadvantage of requiring more arresters—that is, one for every street conductor. It also requires more room on account of the extra rack for mounting the arresters.

Although each of the three methods has its advocates among competent engineers, the consensus of opinion seems to be strongly in favor of the method wherein the arresters are carried on the switchboard side of the main distributing frame.

Practice differs to a considerable extent when this latter arrangement is used as to the method of connecting between the street cables and the line side of the main distributing frame. One method, and under certain circumstances a good one, is to end the street cables within the exchange in pot-heads, running from these pot-heads small regular switchboard cables to the main distributing frame. It is common in this case to use twenty-pair switchboard cable, and where the condition of the portions of the building through which these cables are to pass is such as to be depended upon for absolute dryness there seems to be no reason why this cable should be lead-covered. They are, however, frequently lead-covered, although when this is done larger cables than twenty-pairs are commonly used. The dividing up into small cables at the pot-head is of distinct advantage in distributing the wires of the large cables properly to the terminals on the distributing frame, and is to be preferred to bringing the larger cable to the distributing frame and having to split it up so as to accommodate it to several strips.

Another method and one widely used is to use in the place of pot-heads a considerable length of wool-insulated cable, lead-covered, this being spliced directly onto the street cable and serving in itself to keep moisture out of this cable.



I have a grounded system, according to Fig. 1, and I would like to know if it is possible to put an automatic clearing out lamp system in. I have thirteen switchboard transmitters, solid back type, and I wish to make them operate on a central energy basis. Give me also a rule for the calculation of current, and the type of storage cells that I need for the purpose.—C. S. H.

Fig. 1 is a sketch of a series drop local battery system, so arranged as to ring out on either cord, with the listening key connected at the middle point of the low resistance clearing-out drop, and from thence to the secondary of the induction coil, through the receiver and a six-volt battery to the ground. This six volt is for the benefit of a reliable busy test, which operates as follows: As long as the multiple jack is not occupied with a plug, the sleeves of the jacks stand open. As soon as the plug of some operator's position has been introduced, the sleeves of the entire multiple are put in connection with the ground through the subscriber's set. When the operator has a call for that line, she touches the tip of the plug to the sleeve of the jack. As the sleeve is now in use, the battery underneath the receiver has a path, and it flows through the receiver on out through the subscriber's set, giving everybody a click, and thereby notifying the operator that the called for line is busy.

To cut over such a system, or rather to modify it, so as to give one disconnect signal, the first proposition on hand would be to put a condenser in each local battery bell circuit, so as to hold the circuit open to continuous currents, and still allow the magneto calling. When the operator answers the connection, with such a cord circuit as is shown in Fig. 2, the system becomes a combination of local and common battery. *R* is a 100 ohm relay, directly connected between the ten-volt battery and the strap wire connecting the two ringing keys. The armature of this relay governs a twelve-volt lamp, which is lighted when a party is off the hook. This is in direct opposition to late practice, but not in all cases, for there are 1,000-line boards working successfully with lamps lighted during conversation and extinguished upon completion. In parallel with the battery and cord relay is the operating set with a condenser in series with the induction coil secondary and receiver. This is a single disconnect system, only showing results after both parties have hung up, as a clearing-out system has been asked for. The busy test of this system is loud and reliable. If the jack of some multiple line is busy, then the sleeves are connected with the earth as in Fig. 1. When the operator touches the sleeve of the jack with either of her plugs, the current will flow through the relay, and store up energy in the core of the coil. When the plug is pulled away from the jack, the energy of the core manifests itself by self-induction, and discharges its current into the operating set which is connected in parallel.

If a double disconnect signal system is desired, then two relays of 100 ohms are required, as shown in Fig. 3. *R1* is the calling relay, and *R2* the answering relay. Each relay controls a twelve-volt lamp. To prevent transmission being weakened by the two relays, a condenser *K* is placed in the strap wire between the inner contacts of the two ringing keys. The operating set, and the busy test are as in Fig. 2 system, and the two lamps record the actions of the subscribers, while using the telephones.

As to the transmitters, it would be of no use to change them to a common battery type. Just attach them all to the same storage battery, which should not be very far from the transmitters. As the battery plant may call for five cells for the twelve-volt lamps, each two-volt cell can be made to furnish current to at least two or three transmitters. As there are thirteen transmitters and five cells, three of the cells would have three transmitters, and two of the cells have two each. There would be an unequal load, which would in time assert itself. This could be obviated by throwing the transmitters over on the two cells showing the greatest amount of charge. Thirteen transmitters would consume each one-fifth of an ampere, and it would not be unreasonable to say that this would be the same as seven transmitters for twenty-four hours or about thirty-five ampere hours. You should install a storage plant of not less than 200 ampere hour capacity. There are a great many efficient storage battery systems, and no particular choice can be made.

Are there any patents covering the use of split ringing? I desire to make use of a two party scheme, of using regular bells, with the ringers on each side of the line to ground.—E. T. S.

Such a method is old, and as there is no special apparatus required, it is doubtful that any patent ever effectually covered the scheme. It is a natural method of ringing, and it is certain that none would care to bother you in the use of such a scheme. There seems to be a growing disposition on the part of many to ride over even the ideas that have been patented, which disposition is leading to the time when an idea cannot be patented, unless some detail of special mechanical contrivance is connected with it. Go ahead with your party line service. Many kinds of service is just as necessary in telephone practice, as in any other transportation method.

We have eight grounded lines running on the same pole line for five miles. At times the cross talk is almost as plain as it is on the same circuit. Is there any way of stopping cross talk on a grounded circuit? Will a return wire run under the cross arm help any, or can they be transposed in any way as to help matters?—I. V. P.

This seems to be a leading question, and it can be safely said that more space has been devoted to this question than any other part of the telephone business from the small exchange standpoint. There is no way of stopping cross talk on a grounded circuit. A good return may help, but the *good* return generally degenerates into a small rusty wire. One can hear all the cross talk possible in any common return system. In cities of over 10,000, the common return should be made illegal.

Are there any advantages in connecting open circuit batteries in series parallel? Please show sketch of same. We have a number of signal batteries in and about the mine, and would like to know if it would be more profitable to connect them in series parallel than in series.—R. R. G.

It is hard to see where it would be profitable to connect the batteries in series parallel. It might be servicable, however. By connecting them in series parallel, you increase the output of the batteries, as regards volume of current, without raising the voltage of the original battery. There are times when a battery is called upon to supply more current than it can furnish, or is exhausted by long usage. It is then that it can be said to be profitable to connect another set of batteries in parallel with the original battery. And in mining signal work, it might be a precaution to have batteries in series parallel, as one set of cells might become open circuited for some reason, and the set in parallel will carry the load. Instead of a drawing to show a series parallel arrangement, a description will suffice. Imagine the point *A*, attached to the zinc of a cell. The carbon is connected to zinc of cell No. 2. Then carbon of cell No. 2 is connected to cell No. 3, and so on till cell No. 5 is attached by its carbon terminal to imaginary point *B*. We have now five cells in series. Now take the zinc of a cell and connect it to the point *A*. Connect the carbon of No. 1 to zinc of cell No. 2, and so on till the carbon of cell No. 5 is connected to the same point *B* as the first set of cells. The two sets of cells are in parallel now. Each set is in series as regards itself, but each set taken as a whole is in parallel.

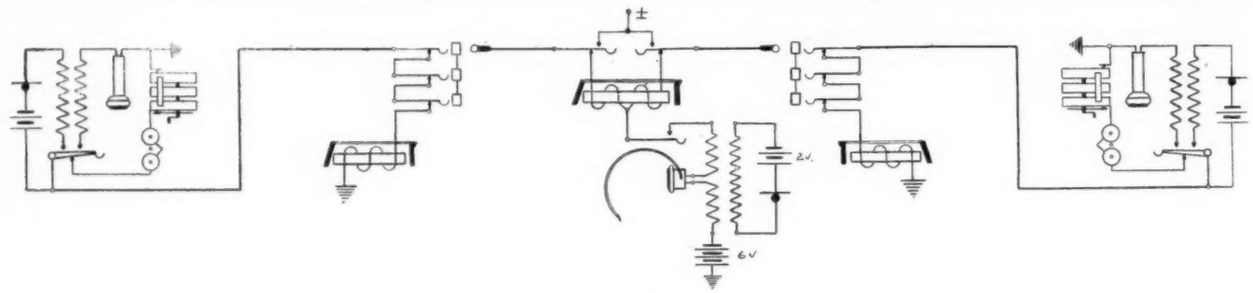


FIG. 1.

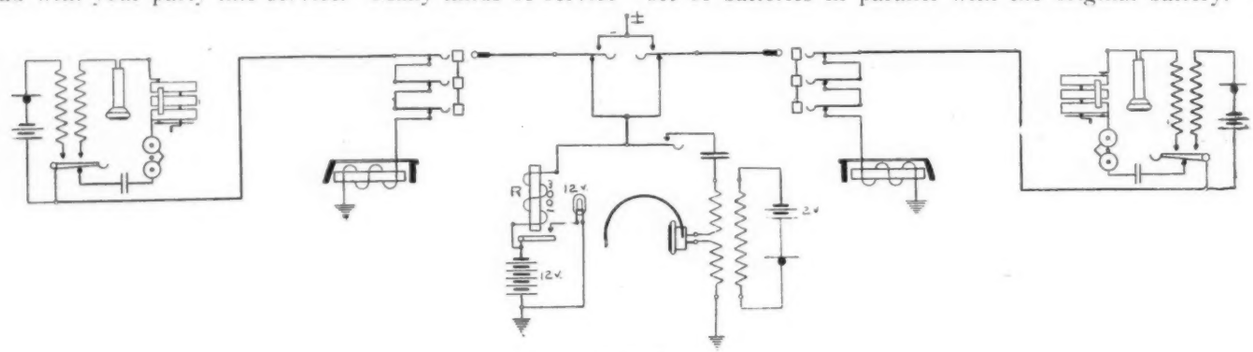


FIG. 2.

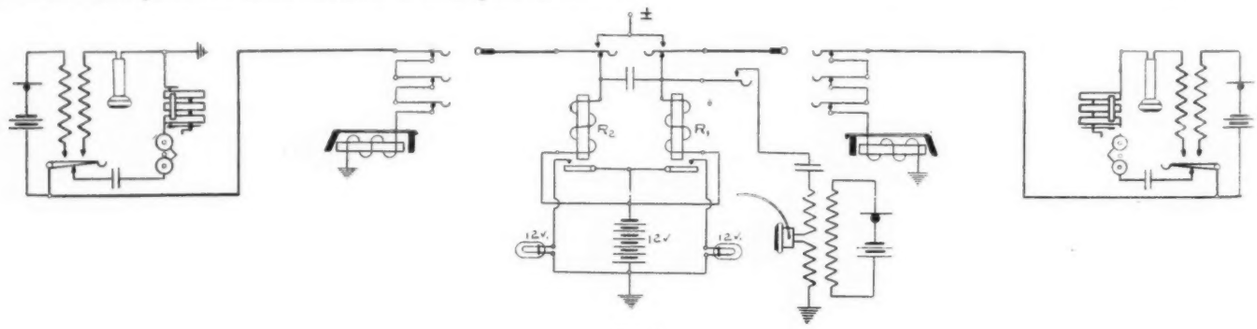


FIG. 3.

Therefore, the arrangement may be said to be in series parallel.

Kindly advise whether it is better practice in towns to set one pole on a corner with arms crossing each other at right angles or to set two poles with arms canted to make the turn; also what is the most improved arm wire? I mean the wire connecting the arm wires to the cable pole house.—E. S.

This question has been submitted to a few construction men, and the opinion seems to favor the one pole angle turn. However, if there is plenty of room, the double pole construction would be good practice. If you had to supply circuits in both perpendicular directions, the corner single pole would be the effective construction. Some companies use okonite wires for such connection, and others use what is called simplex wire. This simplex will last many years. It is advisable to use paired wire for this purpose; that is, when everything is metallic. As it is easier to trace, if numbers are not straight.

Kindly explain the two frequency ringing party line scheme in use by one of the leading companies.—R. R. J.

The connections of the subscribers' sets of this system have been published and sketched in the advertisements, and should be familiar to all the readers. There is a great deal of knowledge to be gained by looking carefully at all advertisements. This two frequency ringing scheme uses the earth as a return, and ringing currents are sent over each side of the line; that is, the low cycle current can be sent over the one side of the line by one key, and over the other side by another key. The higher frequency current is sent over one side by one key, and over the other side by another. Such a ringing key would have six cams, of which four are devoted to selective ringing, one to straight line ringing and the listening key. One of the low cycle keys could be used for regular line ringing. The fifth key is necessary at least when the four keys are devoted to pulsating ringing. Then the fifth key is devoted to alternating current. But in the case in hand, we will assume that the key No. 1 (imagined) is devoted to ring-low frequency on the battery side of the line. Key No. 2 is high frequency on the battery side, key No. 3 low frequency on grounded side of battery, and No. 4 the high frequency on the grounded side. It can be said that the battery is grounded on one side. If not, there is no advantageous reason why it is not.

As has been shown in the columns of TELEPHONY, there is considerable difference between a current of, say, twenty cycles, and that of sixty cycles, even though they have the same voltage. That is, the effects of the currents upon the same object are widely different. A railroad train running at twenty miles an hour does not meet with as much wind resistance as the train running sixty miles an hour. Likewise, the twenty cycle current will not meet with as much electrical resistance as the sixty cycle current, and consequently more current will flow at twenty cycles. In series with our thousand ohm bell, let us put a resistance, say, one thousand ohms, with a laminated iron core inside the coil, so arranged that the core may be enlarged or diminished in size. The twenty cycle current will pass out along the line, and flow through the bell and the resistance in series. It does not meet with much resistance, comparatively speaking, and the thousand ohm coil will allow enough of the twenty cycle current to flow to ring the bell. If the bell is located at a distance, the removal or addition of some of the laminations of the core will serve to adjust the current. Now suppose a sixty cycle current passed through the bell and the series 1,000 ohm coil. Its rate of change is much more rapid, and it increases the resisting effect of the 1,000 ohm coil to such a degree that the current is too weak to agitate the bell, and therefore the sixty cycle current passes through the twenty cycle bell, but without visible effect.

To arrange the sixty cycle bell, the laminated iron cored 1,000 ohm coil is placed in parallel with the bell. Now, consider the sixty cycle current, which failed to agitate the other bell. It passes through the two coils, which are in parallel, fairly without much trouble, but it finds the 1,000 ohm resistance coil of higher impedance, and thus forces more current through the bell.

The effect of the twenty cycle current will be that it will pass through the two parallel coils, but being of low frequency, the rate of change being low, the parallel coil will absorb most of the energy, and the bell will not get enough current to ring. The adjustment being made by the addition or removal of the laminations. The turns being a fixed quantity, the only change that can be made is in the amount of iron in the core.

The same arrangement is carried out on the other side of the line to earth. It is a case of split ringing, only with two different kinds of current. It takes two generators to supply such a current, and they will have to be run at constant speed. A great many generators are run from the battery, which, while in a state of charge, ranges from two to two and one-half volts per cell, or a difference of twenty per cent. This would mean a difference of twenty per cent in the number of cycles, and the arrangement of adjustment would not support such a difference. This two frequency ringing method, and the late four frequency method, are very ingenious, and show the close relation of telephone engineering to power engineering.

We have two metallic lines that are normally quiet. When connected they are very noisy. One line is eighteen miles long, transposed at every half mile, and runs from our exchange into Cincinnati. The other is eight miles long, is transposed every half mile, and extending into a country without any electrical disturbance. Both circuits are of extra BB wire. This noise only shows when these two lines are connected. We can connect either of these lines to any line of our board, and there is no noise. We have put the lines on different jacks and cable wires, and made every possible change, all to no purpose. We have been over both lines, and find them as well insulated as glass will make them. We have done everything we know of to stop the noise with no results.—B. C. Tel Co.

From the above, we glean that the long line is a metallic line with a great amount of inductive possibilities, as it runs into a city where street railway and lighting currents are numerous. We are told that the line is normally quiet. This shows that the long line is well balanced, and not at fault, because all the other lines except the short eight-mile line can be connected without noise. Then it is up to the eight-mile line, if that expression is allowable. But the eight-mile line is all right when connected to the other lines. Then it can be said that the short eight-mile line is all right, too. The same method of proof has been used. But this short line is all right only when connected to the lines not running into the city with all the inductive disturbances. So it is up to the eight-mile line, because a line may be quiet when one side of the circuit is of No. 12 iron and the other side No. 10, if there is no inductive disturbance. But suppose the trolley parallels this line of unequally sized wire. That line will be too noisy to use, because of unbalance. A line that is quiet when paraleled by the trolley is normally balanced, but it may be said to be very critical about the connections made with it. It is very searching, and when connected instantly picks out the weak spots in the connected line, and roars accordingly. That is what happens in this case. When the other lines are connected to the eighteen-mile line the connection is quiet, because the eighteen-mile line has not found any inequalities. But in the eight-mile line it exposes a weakness. And it proves that the eight-mile line has existed in a state of latent unbalance until connected to a searching line. The eight-mile line, therefore, has some poor joints, or some instruments in series, or something that makes one side of the line have a greater resistance than the other side of the line. If the cord circuit is balanced, having a bridging drop, the chances are that if the eight-mile line is carefully measured, it will be found to be unequal. Take a bridge, and measure the

two sides of the eight-mile line, using the earth as a return, if no other line is convenient. A repeating coil would help matters. One pair of cords coud be equipped with the repeating coil, for communication between these two lines. By this method, the unbalance of the eight-mile line might be shielded from the searching effect of the long line and a quiet connection might be accomplished. If it would, then there would be the labor saved of testing out the line for the bad joint.

While engaged in working on the installation of the X system, I noticed that the cables for the trunks between the offices were of No. 19 wire, while the subscribers' circuits used No. 22. Why is this?—A. G.

This is the usual practice, to use No. 19 for trunking. The trunks are usually much longer than the subscribers' lines, some trunk lines being ten miles long, and in such a case, the operation of relays and signals would be seriously impaired by the high resistance of the trunk line. The cord relay of the system mentioned will operate successfully through 750 ohms, of which the repeating coil windings, relays at the trunk end and heating coils make up 400 ohms, leaving about 350 ohms for the line proper. The average subscribers' line is not above 300 ohms, and No. 22 cable, 400 pair, will give just as good results as No. 19, and is cheaper.

Is the residual magnetism of a relay of sufficient force to hold the armature after the current has stopped flowing through its windings? Properly speaking, what is residual magnetism?—A. R. C.

It is barely possible that a relay of good design will retain its armature after the current quits flowing. Some other trouble is present. When a magnetizing force is applied to a coil, and withdrawn, the magnetization remaining in the core is called residual. Soft annealed iron shows more residual magnetism than any other substance, the residual being nearly as much as the induced magnetism. It is less when the current is withdrawn suddenly than with gradual decrease. Tapping and changes of temperature will remove all the residual charge from soft iron. And if placed in an alternating current field it will disappear. Jewelers demagnetize a watch by placing it in an alternating field. A magnetizing force in the opposite direction of the original current will destroy the residual. Relays of short iron cores do not show residual magnetism, because the demagnetizing influence of their own ends keeps them in a neutral state. Hard steel has less residual magnetism than soft iron, but can hold it more tenaciously. A short bar of steel is nearly a permanent magnet in spite of temperature changes, tapping, and the demagnetization of its own poles. It is barely possible that the current does not entirely stop flowing through the windings of your relay, which will account for the retention of the armature, when once pulled up.

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MEASURED TELEPHONE SERVICE.

A Series of Articles by HAROLD D. STROUD on This Most Important Subject.

The question of telephone rate adjustment in a manner that will permit of increased revenue to the exchange companies without decreasing the subscriber's satisfaction with the service is now causing no small amount of thought and discussion among the telephone people in general.

As a rule the Independent companies have started out with the popular service idea. By giving service at rates far below the former rate they have put the telephone within the reach of a large number of people who could not pay the price formerly asked. They have used as their weapon, the single unlimited line, no doubt a reasonably good one, as far as getting new business is concerned. This, however, while it may be a popular service for the subscriber, is not so popular with the capitalist who is looking for a safe and profitable investment.

The need for greater remuneration than is possible on such a basis has asserted itself, and the problem has been how to increase the revenues without that loss of prestige which must surely follow an attempt to increase the rentals. Raising the rentals is always attended with a loss of patrons, as well as the loss of possible future subscribers, while the people who must keep the telephone and submit to the "extortion," as they often term it (though their rates may have been ruinously low prior to the increase) cannot be counted on as future disciples of the company's policy. On the other hand, they will more likely be looking for an opportunity to retaliate.

The general impression created by this mode of increasing the earnings of a company is that the company has been forced to back down. Such a move carries with it the characteristics of failure to do what they started out to do, and leaves a bad impression concerning the company on the part of its patrons, a thing that can least of all be afforded by any public service corporation.

Popular service is what the telephone companies need in reaching the public to make their business successful, and primarily popular service is cheap service, or, rather, cheap service is popular service. Under the flat rate, unlimited service plan, a comparatively few people pay for the telephone service enjoyed by the public. These few people pay high rentals, unnecessarily, and the company gets a small fee per call. The fixed rate which it collects from the subscriber is the limitation of its possibilities in the way of revenue, while there is absolutely no limit but the full capacity of the line on the amount of work it is required to do in return for what it earns. The company is at the mercy of the subscribers who have no natural motive to lighten the work of the operators and repairmen; on the other hand, they seem to be inclined in the reverse direction. It may be said in general that this way of giving service works against both the subscriber and the company: Against the subscriber because he must pay a high rental for that which his neighbor uses, but pays nothing; against the company because of the fact that the unrestricted use of its property makes its expenses heavier than they should be and prevents its future growth because persons who can have the use of a neighbor's telephone gratis, are unlikely material out of which to make subscribers.

From the viewpoint of the subscriber's interest the uniform flat rate seems most inequitable. For instance, where flat rate service is $100 per year. It is $100 per year to the small user who makes but few calls, and $100 to the large user who keeps the line busy from morning till night.

Cases have occurred where, in their efforts to increase rentals, companies have carried the matter into the courts, against the public opposition. The least that can be said of this plan is that it is contrary to any aim to make the service popular and retain the good will of those who must be depended upon for patronage.

Instead of looking for a way to make the telephone cost the subscribers more, the companies should be aiming to offer them service at a rate so cheap that all who have use for it will have no excuse for not being a patron. But the cost of building a good system and maintaining it in a

proper manner, and operating it, to give high-class service is such as to make it necessary to derive better returns for such investments than are being realized from rates in vogue in a great number of places.

The plan of charging on the "zone" system has been often discussed and tried, but there is doubt whether it has been at all satisfactory. To the writer's personal knowledge it has not been satisfactory in some places. The advocates of this plan contend that as the line and cable plant is the most expensive, it would be logical to base the rates according to the length of line, and to graduate them he must draw a line or lines somewhere, so he takes the exchange as the center and encircles it in zones of various diameters. For all stations in one zone he gets a certain rate per year, for the next zone he gets a greater rate, etc. The greatest objection to and argument against this scheme is that the man who can best afford to pay the high rate is nearest to the center where he gets the low rate, while the small user, or would-be user who needs it most, because he is farthest from the business centers, finds his rate prohibitory.

Appropos to this argument, one can conceive of no plan so unjust as that under which a subscriber on the outer edge of one zone gets his service for, say, $10 per year less than his neighbor just across the street, who happens to be on the other side of the imaginary line. Another unsatisfactory feature of this plan is that in a growing plant it becomes necessary from time to time to build additional centers of offices connected by trunk lines in order to reduce the average lengths of subscribers' lines. Thus when a center is established it is usually to lighten the work of another exchange or to shorten its lines, and the shortening of the lines calls for a readjustment of the rates on all the lines affected. The result of this, in its effect upon the company's interests, is that after spending money for extensions and improvements it is required to make a large reduction of the revenues from a number of its lines.

A writer on the subject of charging on the zone basis concludes his remarks by saying: "Those in the outer zone who might find their rates raised would perhaps not be so enthusiastic, but no great reform is accomplished without there being some sufferers and some complaints. In the long run people would adjust themselves, as they have in other changes, based on reasonable and correct principles, that have been brought about by the march of scientific progress."

It is perhaps true that the people who are already subscribers might adjust themselves to the change, but how about the growth of the system outward from the centers and into the suburban districts where these additions enhance the general value of the service? One cannot well afford to place a limit upon the scope of the service and attain the fullest measure of success.

There is a peculiarity of telephone service in that it is valuable to the subscriber in proportion to the number of people with whom he is able to communicate. Remarks have been heard from subscribers somewhat like this: "I can get a telephone down in Podunk for 50 cents a month. Why should it cost any more here?" Leaving out of consideration the comparative cost of building lines in Podunk and in any large city, he forgets that for his 50 cents he can reach only about fifty people, and if one cent per station is the basis of its value, the service in a place like Chicago or New York would be worth about $50 per month. This is only an illustration of the depth of thought that the public gives to the rate question, and it will never understand why one should pay more than another with only the matter of distance from a distributing point the consideration and ruling element.

Perhaps enough has been said about the flat rate plan to make possible the comparison which it is desired to draw.

No good reasons can be seen why telephone service should not be paid for in proportion to the amount used. We pay for gas at a certain price per thousand feet, and for water and electric current on a like basis. There was a time when these were sold at a fixed rate per month or year, and the change which has taken place in these classes of public service is but the natural evolution in economic and progressive management. The railroad company gets a fixed rate per mile for passengers, and freight is carried according to its weight, or the space it takes up.

Suppose the railroads sold tickets, good for one year, for fixed sums, which, when not in use by the owners, could be used by their friends. Such roads would have to go out of business in a short time, because no one would buy a ticket of his own while he could ride on another's. This point should be emphasized with regard to the telephone business. When we compel the non-subscriber to contribute toward the support of the business in proportion to the use he makes of it, we are not only doing justice to ourselves, but to the subscribers as well.

We are enabled to offer to the public a plan by which nearly everyone can have a telephone, and by using it on necessary occasions can keep his expenditures down to a minimum, while at the same time he has the telephone there for incoming calls, which cost him nothing, as they are paid for by the calling party, if he happens to be a measured rate subscriber.

Measured rate service opens up a vista of possibilities for the telephone companies not apparent to the casual observer. For instance, in a measured rate system, a number of telephones may be placed in railway stations without charge to the railroad company, as they are points of recognized value to the service. Then, if these telephones are properly answered so that information relative to the arrival and departure of trains can be readily had from these sources, it can be easily seen how they would add to the revenues from the measured rate service, though the instruments in the railway stations did not directly pay the company a cent.

If the reader will look at the street railway methods of increasing their traffic he will see them making or improving parks and pleasure resorts along their lines, knowing that a large number of people will pay a fare or two occasionally to visit them. This is in the way of using up the by-product, so to speak, as they can run their plants and force more economically if they can keep busy, while not depending solely upon the regular, necessary traffic of the public.

Here is the salient point: The first thing to do is to get subscribers and then induce them to use the telephones for additional purposes. Of course, we can see no reason for trying to increase the traffic on flat rate lines. The reverse is true. But let us presume that the majority are measured rate subscribers. Here we have quite a different proposition. As soon as we get paid for each call made we have lightened traffic, which means more time for the operators to attend to a given number of lines or that a greater number of lines can be handled by each operator. This fact is due to the elimination of dead-head traffic and unnecessary calling. The service is also rendered more satisfactory to the subscribers in that the "busy line" nuisance is reduced.

In a certain system where the 10-party line is used in connection with the nickel service plan, an observation of the traffic on such lines shows an average of about 4 calls per station for 24 hours. These lines, although they sometimes have the full number of 10 stations, actually average but 6 stations per line, which would be 24 calls per line per day. In the same system the flat rate traffic averages about 20 calls per station in the same period of time. Though the traffic is greatly reduced, the fact that each call is paid for cash on delivery makes it more profitable to the company, as well as being more popular with the subscriber, who can make his bill as large or as small as he chooses. It is obvious from these figures that the placing of collecting de-

vices on the lines to collect the toll for each call completed lightens the traffic and makes it possible to operate party lines without the objection of overloading, which has been a bad feature of flat rate party lines.

In any system there are a certain number of subscribers whose lines are conspicuous for getting the "busy" back. That means, of course, that a subscriber has inadequate telephone facilities for his business, or, to quote from an article by a previous writer on this subject, "His door is closed," or partially closed, sending people who desire to do business with him elsewhere. Suppose a telephone company should send to him and offer him additional service on the measured rate plan, after being able to show him exactly the number of "busy" calls that he has received during a certain period, and agreeing with him that if he would adopt this additional measured service the company would put all incoming calls upon this line unless it happened to be busy, so as to leave his unlimited line free for originating traffic. He is likely to be interested in such a plan, and upon adopting it he will find occasions enough to use the measured service for outgoing calls to meet the guarantee which he must make, and often greatly to exceed it. He would, in addition, have a good excuse for inviting the "dead-head" to drop a nickel when he wished to use the telephone, as he could show him readily his reason for putting in the additional service.

This class of service is what might be termed "double-track" service, and is coming into very general use among the larger companies.

Most people who have much to do with the management of exchanges, if asked as to what class of subscribers are the hardest to get to answer their calls will say "the railroad companies." This is especially true in smaller places. In the large cities they are hard to get because most always busy, and making the subscriber wait unnecessary. The principal reason for this is that there are so many people calling and asking the same questions, that is, about the time of train movements, that the clerks or operators cannot properly attend to their regular duties and answer the bell every few seconds. If the measured service subscriber is unable to get these places there is a direct loss to the telephone company. On the other hand, if a plan were had to furnish this information to the subscribers or the public from an independent source in the control of the company there would be a direct gain in dollars and cents to the telephone company. Therefore, in a system large enough to afford it, where the traffic is based on the measured service plan, the establishment of a bureau of general information where a subscriber or the public could call and be informed as to the movement of trains and boats, also to get information in regard to the location of buildings or streets, and any other general knowledge which can be readily given by this department, would be a means of stimulating traffic and a direct source of increased revenue to the company. Such a plan has been tried in some eastern cities, but, as the writer is informed, it is gratis to the subscribers, who are largely flat rate patrons. Such a plan would be a source of expense rather than one of revenue to a company adopting it.

When a company concludes that the measured service plan is desirable, and wishes to make a trial of it, the first question that will arise is how to make the change. One company that has made a success of such a service solved it in this way: It did not go to the subscribers that it already had and ask them to change, but sent out into a portion of its territory where there were ample line and cable facilities for growth, a wagon load of telephones, and a number of men. Upon the wagon were conspicuous signs announcing the fact that a telephone could be had in any residence for a nickel a day. The men traveled from house to house making a canvass, and as fast as contracts were secured the instruments were taken from the wagon and put in place, the lines being put in later. Five cents a day was the least amount a subscriber could pay on these lines; that allowed him one call per day, outgoing. The telephones were equipped for devices for collecting nickels only. In booming this service the company aimed to condense the territory fed by each of these lines and fill up the lines as fast as possible. In this plan but little cable and switchboard space was required to connect up a thousand subscribers for this "educational" service, as it might be termed. People tried this service who had never before had a telephone or appreciated its value, and found that they had use for it. As this use increased they found that they could afford to guarantee more nickels and get on a line more exclusive, where they would not be bothered by the excessive ringing characteristic of the 10-party line. In this way new subscribers were shown that they could afford to pay the price of even the flat rate rather than be without the service, while some who previously had the flat rate service found they could limit their use of the telephone to fewer calls per day, would change to the nickel service with, in many cases, increased satisfaction proportioned to the saving they made.

Small merchants who really could not afford to pay the price of a flat rate telephone, but were compelled to have telephone facilities over which to take orders for their customers, because others in the same line of business were so equipped, naturally embraced the nickel service, because they could limit this item of necessary expense to 10 cents a day, which was the price charged on 10-party line stations in business places. Often they would not use this amount of outgoing service, but would have the telephone for incoming calls, and by locating it where it would be accessible for use by the public or customers who came into the store, they would find that it was used enough in the majority of cases to make up the guaranty which the merchant had to pay the company, and frequently largely in excess of the amount which he guaranteed. When the merchant found that the average amount collected by his telephone per day, whether for his own business or from the public, exceeded 20 cents or 4 nickels, he could then ask the company to put him on a more exclusive line, where the guarantee was higher. In some places these telephones would collect enough to make it possible for him to have a line all to himself, as was often the case in the system referred to. The company requiring that 6 nickels per day should be guaranteed for such a line. In some very desirable locations these stations were exceedingly profitable.

Where does this revenue come from? From the former dead-head user and the transient public, who previously burdened the service to the detriment of the company and the subscriber. The development of this class of service which has taken place within the past few years is probably the most interesting telephone work in the history of the business, to use the expression improperly, for its history cannot be written until the phenomenal growth has ceased, which will not be until the telephone is a fixture in every house or shop where people live, rather than exist. Some of the possibilities of the nickel service and the measured service in general, that have been shown in the foregoing, offer to the telephone people means for removing what are to many exchanges fatal obstacles.

The succeeding articles will be devoted more to the description of devices that have been developed from the early stage of the work to meet the demands of this class of service, and methods of operating the same.

"What does this mean, Bridget?" exclaimed the lady of the house, returning from shopping; "the telephone's been taken out!"

"Sure, ma'am, the girl over the way came over and said her missus would like to use it for a little while, and I sint it over to her; but I had a terrible job gettin' it unscrewed from the wall, ma'am."—*Electricity, London.*

Telephone Situation in New York City.

D. A. REYNOLDS

New York city is supplied with telephonic communication by the New York Telephone Company, covering the boroughs of Manhattan and the Bronx, and the New York & New Jersey Telephone Company, covering the boroughs of Brooklyn, Queens and Richmond. The former company, covering what is known as "Little Old New York," is capitalized at $50,000,000, and operates about 50,000 telephones, while the latter is capitalized at $16,000,000 and operates about 30,000 telephones in three boroughs and adjoining territory on Long Island and in the state of New Jersey.

Numerically large as these figures appear, when compared with business directories of the greater city and its recent census report, it is found that the combined service of the two operating Bell companies reach but twenty-eight per cent of the business places and only about two and one-half per cent of the residences.

The rates for service by the New York Telephone Company is $240 a year for unlimited service, and a minimum message service rate of $75 for 600 messages, or twelve and one-half cents per message with an extra charge for inter-borough service. The charge between lower Manhattan and the Bronx is twenty cents, while street car service over the same route is five cents. Here is an instance where it costs four times as much to send the voice as it does to send a messenger.

The average earnings of the New York company are, as a matter of course, problematical, the only direct evidence being found in the testimony of Mr. Bethel, at that time manager of the system, before the Senate telephone committee seven years ago, when he reluctantly admitted an average earning of $116.50 per telephone, which is believed to be about sixty per cent of the actual earnings.

The original investment in what is known as the New York Telephone Company is said to have been $170,000, at the time of the consolidation of the Bell and Western Union telephone interests. Surplus earnings have been reinvested in the extension of the plant, until six years ago, when the company found itself with about 18,000 subscribers and a capital stock of $12,000,000. Since then $38,000,000 more stock has been injected into the company, but, so far as known, not one dollar of it has ever been offered for public sale or subscription. This, in addition to regular cash dividends, said to be regular four per cent quarterly with frequent "extras."

The initial cost of building a telephone system in New York city is less than that of any other first-class city in the United States, because the subways of the city are owned by a subway company which operates them under a contract with the state subway commission, created in 1887, which provides, among other things, that:

> The spaces in said subways shall be leased by the party of the second part (subway company) to any company or corporation having lawful power to operate electrical conductors in any street, avenue or highway in the city of New York that may apply for the same. * * * No space not actually needed for occupation by its electrical conductors in due course of its business shall be leased to any company or corporation to the exclusion or detriment of any other company or corporation needing space in said subways and desiring and able to pay for the same. * * * If at any time the space in such subways shall not be sufficient for all the companies or corporations so applying for the same, or for the city of New York or any of its departments, the additional space needed shall be provided by the party of the second part at its own cost, by the construction, equipment and operation of additional subways sufficient therefore. * * * All companies occupying space in said subways shall own their own conductors and shall have the full management and control thereof. * * * The party of the second part shall give a bond to the parties of the first part (subway commission) and their successors, in the penal sum of $250,000, * * * securing the just and full performance of this contract, and the building or providing of said subways, as herein provided; * * * and nothing in this contract nor in the contract hereby amended and modified shall be construed as granting to the party of the second part any exclusive privilege, immunity or franchise whatsoever.

These subways are leased at $800 a year per mile duct, and the company occupying them must pay one year in advance and give a bond for the payment of four years' rental additional. This increases operating expenses, but relieves a company of the initial investment to equip a subway system. While this may appear excessive, it should be remembered that New York is solidly built up, and under modern construction such as is proposed for Chicago, the capacity of an 8,000-line board could be filled in an average cable radius of one-half mile, thus reducing duct rental to $400 per year, per cable. The comparatively short cables permit of many wires, and it is deemed perfectly safe to use 400-pair cables for local distribution and 200-pair cables for trunking purposes. On this plan of distribution, duct rental for local distribution is reduced to $1 per circuit, with corresponding maintenance charge.

With an average half-mile radius, G. L. Wiley, of the Standard Underground Cable Company, estimates that the distributing cables could be furnished, drawn and spliced at a cost of $15 per circuit, so that if we allow the maximum for telephones, switchboard and other accessories, we yet find that the New York Telephone Company's capitalization of $1,000 per telephone is adequate to cover the cost of installation.

While the natural conditions affecting the telephone business in New York city may be obtained with reasonable accuracy, the methods employed by the Bell interests to protect its field must, of necessity, leave something to the imagination.

The first attempt to enter the New York field was made by the Stroger automatic system, which proved abortive, it is claimed, on account of the necessity for frequent trunking. This company obtained about 10,000 subscribers before discovering its mistake and was forced to abandon the field.

The second attempt was made by the People's Telephone Corporation, organized in 1898, composed of twenty-five members of the New York Board of Trade and Transportation, each subscribing for but $1,200 of the capital stock of the company and receiving six times as much in addition (7 for 1) from the promotion stock. This fund of $30,000 was for the preliminary canvass, it being proposed to build the system on popular subscription after contracts for service had been secured.

A canvass was instituted and over 8,000 five-year contracts secured for service. When 5,000 contracts had been secured, the solicitors were permitted to receive subscriptions to the preferred stock of the company at par, subscriptions being limited to telephone subscribers only, and no man being allowed to subscribe for more than twenty shares. In two weeks subscriptions for over $200,000 worth of stock had been received and the "privilege" of a subscriber was at a premium; in one instance a man subscribing for five telephones in the names of five members of his family in order to get 100 shares of stock.

About this time certain members of the board of directors discovered that their holdings in the company were abnormally small, and required the originators of the enter-

prise to relinquish $100,000 additional bonus from the promotion stock. This was granted for the sake of "harmony," but in less than a week another $100,000 was demanded and refused.

Simultaneously the subscriptions to the capital stock were suspended and within a week later the canvass ceased, notwithstanding the fact that the cash was rolling in at the rate of about $15,000 a day and five-year contracts at the rate of about 800 a week.

Within the week that the canvass was discontinued, a company composed of New York city law clerks was organized in Delaware, the birthplace of other iniquities, known as the People's Telephone Company, for the purpose of doing a telephone business in New York city, but was prevented from filing its charter in Albany by the founders of the People's Telephone Corporation, who could not, however, prevent the sale of the latter company to the Delaware creation, after its successful strangulation by four of its directors.

An important interview occurred about this time between the president of the People's Telephone Comporation and one of the founders of the enterprise in which reference was made to the public press and the New York grand jury, and the next meeting of the board of directors, called in a hurry, voted to refund all moneys paid in on subscriptions and return the patents and subway franchises for Brooklyn, which had been secured for the benefit of the company.

Before any definite action could be taken looking to the organization of another company, it began to be rumored that certain interests were about to launch a very large telephone company which would consolidate between 800 and 900 small telephone companies under a central management, it being slyly hinted that the "management" knew all about the telephone business, while one of the promoters confided to a gentleman sent to him for a purpose that: "This is one of the deepest laid schemes you ever heard of." Ten days later articles were filed for the $30,000,000 aggregation known as the "Telephone, Telegraph and Cable Company of America," with some of the best-known capitalists in the East as stockholders.

Within an hour of the filing of the articles of incorporation, copies were printed and the most prominent features of the charter were made the subject of a circular; one of the most striking features and one of the greatest benefit to the Independent cause being the proviso that when ten per cent should have been paid in on the stock, the original stockholders were no longer held liable. With this strange proviso in its charter, Independent companies began to look for the colored gentleman in the woodpile, and the 800 or 900 Independent systems dwindled to eight small operating companies and a few charters, or purely paper companies.

The "deepest laid scheme" had evidently miscarried, and the $30,000,000 company was without a mission. It was then proposed to annihilate the Bell company by investing the $4,000,000 paid in by the stockholders in purchasing the stock of the Erie Telephone Company and hypothecating the entire stock of this $30,000,000 company to get control of the Erie company. This purchase is said to have been made on a basis of $14,300,000, although it was currently reported that the company had been offered to the parent Bell company less than sixty days previous to the sale on a basis of $10,000,000, the offer being rejected, notwithstanding a reported unpaid royalty account approximating $6,000,000.

So it was that the fly caught the spider in its own parlor and it was given out that the great Independent company had swallowed one of the legs of the Bell octopus, comprising one-sixth of its entire anatomy.

Then followed a period of inactivity in which the acquired plant at Mt. Vernon, New Rochelle and the other six exchanges were systematically smothered, while franchises in Yonkers and other places were allowed to lapse. Some of the stockholders who had gone into the company believing it to be a legitimate enterprise, became restless, and when they found that they had been led into the Bell camp and were in reality a Bell licensee company, began to bring a pressure on those responsible for their dilemma, which made life very unpleasant.

But the "deepest laid scheme" had not run its course, and the next thing heard of the Telephone, Telegraph & Cable Company of America was at Baltimore, where a syndicate, headed by Alex. Brown & Sons, was to underwrite $18,000,000 of bonds for a $40,000,000 company, which was to take over the Erie company, the Baltimore and Pittsburg systems and the few small plants that had been acquired by the Telephone, Telegraph & Cable Company of America. But in some manner Mr. Brown became aware of the scheme and declined to be identified with it in any manner, and Erie stock fell from $112 to $64 in a single day and was soon wiped off the boards. Again the "deepest laid scheme" had miscarried.

About this time, some of the impertinent stockholders began to inquire how their executive committee came to purchase the Erie company at a price $4,300,000 in excess of its reported offer, and one of the committee found that he needed a European trip, while another member of the committee concluded to buy in all the outstanding stock at fifty cents on the dollar, and save his fellow stockholders from further loss.

Such magnanimous action at that critical moment has met with a great deal of comment, as few men would have been willing to volunteer a $2,000,000 loss unless it was to accommodate a particular friend or corporation. Others have surmised that the hypnotic influence that caused four of the directors of the People's Telephone Corporation to strangle their company and sell it out to a company created for that purpose, might have been the Svengali that furnished the $2,000,000 for buying the stock of the Telephone, Telegraph & Cable Company of America rather than disclose the secrets of the black art. But one other effort has been made to give the Telephone, Telegraph & Cable Company of America standing as an Independent telephone company and that was when it employed James M. Thomas to come to New York and act as president of the company for eight months. Since then the mask has been removed and an old employe of the Bell company has taken the position of president, and the company is no longer heard of as an Independent.

The field again becoming clear, the Atlantic Telephone Company was organized with an authorized capital of $5,000,000 and purchased the stock of the New York and Eastern Telephone Company to whom had been granted the perpetual subway franchise for Brooklyn. It has conducted a partial canvass of the city resulting in orders for over 75,000 telephones, a large proportion of which are for five years. These contracts, on a most conservative estimate, will give it an annual net earning of over $5,000,000, and these, in conjunction with its franchise rights, forms the basis of its present underwriting negotiations.

The engineering department of the Atlantic Telephone Company is in the hands of Arthur Vaughan Abbott, C. E., with Dr. Louis Duncan, Ph. D., as consulting engineer. Maps and profiles for seventeen exchanges have been drawn for the borough of Manhattan, with an ultimate capacity of something over 200,000 lines.

In conjunction with the Atlantic Telephone Company, there has been organized the State Line Telephone Company, designed to serve as a connecting link between the Atlantic Telephone Company and the thousands of Independent exchanges in the East and Middle West, and the prospects now are that in the very near future New York, like her sister cities, will have the benefit of modern telephone service at a rate approximately one-half present charges.

New York has plenty of money for investment and there is not a man in business in the entire city who does not realize that the telephone business as conducted by the New York Telephone Company is the greatest and most arrogant monopoly in existence. They know, too, that at half the present rates, an Independent plant would pay fully 100 per cent on the actual investment with an opportunity of installing four telephones to every one now in use. The small investor would absorb the securities of a company faster than the money could be judiciously expended in construction, while the business community would patronize it to a man.

What Independent telephony in New York City needs is a financial Moses to lead it out of the wilderness. A man who is willing to enter a field where a single competitor is now earning approximately 800 per cent on the actual cost of its service, handicapped with a capitalization of $1,000 per telephone and existing in defiance of a popular prejudice. The initial investment need not be large (sufficient to install three or four good-sized exchanges), but it must be legitimate. Once started, local capital will fall into line, and the dominating fear of Bell and Western Union influence will be broken.

A TEN THOUSAND DOLLAR JUDGMENT AFFIRMED.

A personal injury case brought by Perry A. Black against the Rocky Mountain Bell Telephone Company, in which Black secured a verdict at the trial in the fourth district court of Provo county, Utah, of $10,000, was carried to the supreme court of the state, where the judgment has been affirmed for the full amount. The complaint alleged in the usual form that the telephone company had been negligent from which Black had sustained severe injuries. The capacity in which Black was employed was as lineman, and while engaged in the discharge of his duties in stretching a wire fell to the ground and injured his vertebra and spinal organs.

Supreme Court of Utah. Case Decided August 24, 1903.

INJUNCTION PROCEEDINGS IN CALIFORNIA.

The Sunset Telephone and Telegraph Company recently brought suit against the city of Eureka, California, to restrain the mayor of the city, the council and its members from interfering in any way with the company in the erection and operation of telephone and telegraph lines in the city. The suit was begun in the United States circuit court for the northern district of the above named state before Judge Bellinger. The company's bill of complaint aimed simply to secure an injunction from the court to restrain the city authorities from prospective interference; the defence made by the city was an answer to this bill of complaint, but in addition prayed for an injunction from the court to prevent the telephone and telegraph company from "constructing, maintaining, or operating, etc., its poles or lines of telephone or telegraph in the city of Eureka, for local or interstate business, without first obtaining permission to do so under certain ordinances of the city." This prayer for an injunction, which was affirmative relief in its nature and is technically called a "cross-bill," was followed by a prayer that the company be compelled to answer various questions relating to the status of the company's business. These questions, which the city authorities sought to have answered by the company, are in part here noted: "Whether messages sent out of the state must go through San Francisco; whether subscribers desiring to telephone to points outside of Eureka must not first ask the central office to connect with the line running out of the city; whether an extra charge is not made for such connection." Many others of this nature were propounded and also the question if the company had ever obtained any authority to occupy the city streets. The court thought that the whole subject was brought to issue by the complaint of the company and the answer to it which was given in the city counsel's answer. As to the new matter which the city counsel advanced in the "cross-bill," the court said that the company need not reply to it and that the merits of the case did not demand an injunction against the telephone company in the event that the city should win at the trial. At the trial on the bill and answer the court said that all questions relating to the controversy could be settled, and that the right to ask for an injunction by the city "to restrain a trespass not threatened" by the company should not be granted. On this adjudication the case will come to trial on the merits of the complaint and answer at some subsequent session of the court. It would have been usual to have brought the case up at once for trial, but for some reason it was postponed.

Sunset Telephone and Telegraph Company v. City of Eureka et al., 122 Fed. 960. Decided.

THE CITY OF WICHITA DEFEATED IN ITS TELEPHONE FIGHT.

The full opinion of Judge Rodgers in the case of the Old Colony Trust Company against the City of Wichita has appeared and the opinion presents some very important practical legal questions. Although the controversy has become more or less familiar to people generally throughout the country, a short account of the facts which brought on this important trial may not be uninteresting. Some thirty-six months ago the city authorities of the city of Wichita were desirous of annulling the charter of the Missouri and Kansas Telephone Company, it is alleged, to give the franchise to some other company. September 24, 1900, the city council, on motion of Councilman Burton, instructed the city clerk to notify the telephone company when its franchise would expire, which date was April 1, 1901, and that the city would require the company to remove its poles and wires, but no date was fixed when the city had in fact set the time for the final annulment of the charter. January 2, 1902, a resolution was passed by the council stating that in as much as the company's franchise had expired by the order of the council at a previous meeting that it would require the company to remove its equipment; that if the company did not apply to and secure from the council a new ordinance on or before September 1, 1902, that the proper city officers would immediately proceed to remove the equipment of the company. A notice of this order was served on District Manager L. F. Duggan January 4. Under the order over a mile of the poles and wires had been removed when the Old Colony Trust Company, the trustee

of the telephone company, secured a restraining order against the city's action. The case came up before Judge Rodgers in the United States circuit court March 16 last and the written opinion of the court was given out July 25.

The Missouri and Kansas Telephone Company is the outgrowth of the several telephone corporations. November 10, 1886, the United Telephone Company secured a franchise from the city of Wichita granting it the right of way for poles and wires through its streets. The company operated under this franchise until February 25, 1887, when the United Telephone Company was absorbed by the Missouri and Kansas Telephone Company. The latter company took over by assignment the franchise and other rights of the former corporation and under this and a later ordinance, which will be referred to below, was operating when the suit began.

The case, while nominally the suit of the Old Colony Trust Company, which secured a deed of trust to itself from the Missouri and Kansas Telephone Company in consideration for the trust company's securing an issue of $1,250,000 of the telephone company's bonds, was in reality the suit of the telephone company as well. At the trial the objection was raised that the trust company had not such an interest in the affair as would warrant it proceeding in a suit against the city, but Judge Rodgers disposed of this objection by saying that the "trustee, independent of the trust deed, has the power, and it is his duty, whenever the necessity arises, to invoke the aid of a court of equity to preserve the trust estate." The interests of the trust company and the telephone company being alike, the case will hereafter be referred to in the name of the telephone company only.

The city objected strongly to the right of the United Telephone Company to assign its franchise to the Missouri and Kansas Telephone Company. Judge Rodgers again held with the telephone interests and said in effect that the franchise, which was originally granted to the United Telephone Company, was properly a subject for assignment, and that in the present instance there has been a sufficient compliance with the laws of the state of Kansas in the assignment to the Missouri and Kansas Telephone Company. At the time of the suit this franchise had never been repealed and under it the telephone company may operate until 1906.

Judge Rodgers, however, found in his opinions a better reason why the Missouri and Kansas Telephone Company still has a corporate existence. March 26, 1896, an ordinance was passed by the city of Wichita granting the company the right to operate, build and maintain its lines of telephone for the period of five years with the provision that the franchise might be terminated "upon six months' notice to be served upon the managing agent of said company at Wichita; said notice to be served at any time after six months immediately preceding the expiration of five years from the acceptance of the provisions of this ordinance by the company."

As above stated, the company was served with a notice by the city clerk September 28, 1900, that the ordinance would expire April 1, 1901, and that the company would then be required to remove its poles and wires from the city streets. Judge Rodgers said that in as much as the order of the council did not state in any place that the telephone company should be required to move at a certain definite time that the 1896 ordinance had not been repealed, although as the judge remarked, there had been a manifest intention that the ordinance be repealed. Under this view of the case the telephone company had the right to operate under both ordinances and the result was an order from the court granting an injunction against the city as prayed for in the bill of complaint. The decision of Judge Rodgers will be reviewed in the circuit court of appeals of the United States, where the case has been certified to for review.

Old Colony Trust Company v. City of Wichita, 123 Fed. Rep. 762.

NOTICE OF FORECLOSURE SALE OF MICHIGAN BELL COMPANY.

In the August issue of this publication the order of sale of the Michigan Bell Telephone Company by Judge Swan of the circuit court of the United States for the eastern district of the state was noted. The date of the sale was not at that time fixed, but the court has decided on Nov. 4 as the time and has appointed Walter S. Harsha special master in chancery to negotiate the sale, which will take place in Detroit. In the notice of foreclosure it is said that no bid will be considered for the properties that is under $2,500,000. The notice also calls for a deposit of $50,000 as a guarantee of good faith. The successful bidder must in addition deposit the sum of $100,000 with the special master when his bid is accepted. The telephone properties are to be in a lump lot without any division in the telephone system. In addition to the mortgage lien of the Old Colony Trust Company is a mortgage of $285,000 held by the Guaranty Trust Company of New York, which the public is notified will continue as a lien against the property. This lien the last named trust company received in return for an issue of bonds made July 1st, 1897, and for which the trust company gave a mortgage on the property of the company. The buyer will receive a deed of the property on condition of his assuming the liability for back taxes due the city of Detroit and the liabilities which the income from the company has failed to satisfy since the plant has been in the hands of the receiver. The buyer must also discharge all unpaid compensation which was allowed by the court to the Michigan Trust Company as receiver.

MANDATORY INJUNCTION AGAINST AN OHIO COMPANY.

An injunction has been asked by the city of Salem, Ohio, to compel the Columbian County Telephone Company to observe the franchise, which it received from the city and to furnish service to all persons at the rate originally fixed in the city ordinance. The injunction asks that the company hereafter be restrained from refusing to furnish service under the original rates, or from increasing its rate or from removing any of the instruments now installed. The point of interest is whether the company may vary its rates without forfeiting its charter, which has been in effect since 1889. The case has been begun in the name of Farmer and Getz against the telephone company and the city of Salem. It is said that this is to more directly bring the validity of the franchise into question. The suit, however, is being fought by the city solicitor of Salem, L. P. Metzger, and is strictly a proceeding to test the city ordinance.

Farmer and Getz v. Columbiana County Telephone Company and City of Salem, Case Pending.

A NOVEL SLANDER SUIT.

D. S. Farmer, a resident of Macon county, Georgia, has brought a peculiar suit in the circuit court of that county in which he claims damages because one B. F. Jenkins, he alleges, told him that he had embezzled between three and four hundred dollars of money belonging to the Lunday and Zion Telephone Company. Farmer asks the court to award him $7,500 as a result of this conversation in which he claims he was injured to that extent. As in most jurisdictions, the state law of Georgia requires that in slander proceedings the plaintiff must prove that the slanderous words were heard by third parties. This Farmer claims that he is able to do and providing he is able to show this fact there seems to be no reason why he may not make good his claim for damages. As was cited in the September issue of this publication communications over the telephone may be used in evidence in contractual relations and it would appear that the court of Macon county will take the same notice of the above slanderous communication if Farmer succeeds in proving that a third party heard the conversation. Farmer

claims that Jenkins was talking over a party line and in this way the accusation came to the ears of third parties.

Suit pending.

INTERFERENCE WITH WIRES BY BUILDING MOVERS.

The Valley Telephone Company which operates throughout the Saginaw valley in Michigan has issued notices to all building movers in the several cities in which it does business informing them of the liability which they incur in interfering with the company's wires and poles while engaged in the act of moving buildings from place to place. These notices were issued after the company had first obtained the opinion of a leading attorney. The law on the subject, as stated by the attorney, is all on the side of the telephone companies and on the basis of his judgment the company intends to prosecute in the future every act in contravention of its rights.

The act under which the company is incorporated gives it power to construct and maintain lines of wire and other material for the transmission of messages along, over, across or under any of the waters, streets or roads of the state with all necessary fixtures therefor. This is true, provided the telephone properties shall not interfere with any other public uses, or injure trees located along the line of the highways or with the navigation of the waters of the state or the running of railway trains. The opinion cites the fact that the state courts have held that the municipalities may make reasonable rules which the telephone companies are bound to obey in the exercise of the rights under the state act of incorporation.

The moving of buildings along a public highway is not a public use of the same and in most cities it cannot be done without the express sanction of the city authorities. Inasmuch as the right to move buildings at all is a privilege expressly given to the individual seeking it; the proviso follows, of course, that he must not in any way interfere with rights already conferred and especially is this true in the present instance, for here the rights of the telephone company are given by the state and not by the municipality. The rights conferred by the state being superior to those of the municipal authorities, it is seen at once that the one enjoying the latter must respect those of the former since they are conferred by a higher authority. No authority to interfere in any way with telephone properties would be legal without previous arrangement with the companies involved. The authority of the Valley Telephone Company cites the different remedies that the company would be warranted in using in case of interference without its consent. In the event that the damage has been done the remedy would be an action at law for damages to the extent of the damage done; if the act is about to be accomplished the telephone company would be entitled to a permanent injunction restraining the building mover under penalty of a fine. The only limitation that the company would be bound to recognize is that it see to it that its wires and poles are properly placed and that the work has the approval of the proper authorities.

Below is a copy of the notice referred to above:

"To Movers of Buildings:

"It would probably be worth your while to understand the laws of the state of Michigan in regard to moving buildings when you interfere with telephone companies. We have the right to set our poles and string our wires in the streets and highways, providing that we do not interfere with the ordinary uses of the streets and highways. We are advised by our attorney that the moving of buildings is an extraordinary use of the highway and that we are entitled to compensation at actual cost from building movers whenever we have to move wires or poles to let them pass through. From this day onward we must insist that movers of buildings give us proper notification of their desire to move through our wires, and that estimates be made of the probable expense to be incurred by our manager and the mover and that compensation upon that basis be guaranteed to us before our wires are touched."

The Valley Telephone Company, By R. F. Johnson, General Manager.

INJUNCTION GRANTED.

In the circuit court of Louisville, Ky., Judge Owen has granted the Cumberland Telegraph and Telephone Company a mandatory injunction against the Rough River Telephone Company, directing the latter company to remove certain wires and poles located on Union street in Hartford. The controversy has been of long standing and is to be further prolonged by an appeal to the court of appeals.

Cumberland Telegraph and Telephone Company, in Circuit Court at Louisville, Ky.

REGULATION OF TELEPHONE RATES.

Considerable friction has arisen between the Columbiana County Telephone Company of Ohio and the municipal authorities as a result of the plan of the company to raise the rates for service in the city of Salem. The point involved is whether the telephone company may legally make the proposed change without the authority of the council, inasmuch as the raise would increase the rate above the rate provided in the original franchise of the company. In a similar controversy in Cleveland recently, in which the Cuyahoga Telephone Company proposed to raise the rates under similar conditions, the opinions of two of the leading legal firms of that city were consulted and the opinion was given that the council has no authority to establish rates for the telephone company. The firms consulted claimed that telephone companies have the right to use streets, roads and alleys under the statutes and the city authorities have only the right of control and supervision of the street and no authority to control the telephone rates. In case of contention between the city and company the proper avenue of redress, in the opinion of the lawyers, is the probate courts. The defense of the Columbiana company will be that the council has no authority to interfere with rates of the company.

RIGHTS OF SUBURBAN STREETS IN NEW YORK A DISPUTED QUESTION.

Mary L. Weeks is the owner of certain premises at Bayside in the borough of Queens in the city of New York, including a portion of the street known as "Bell Avenue." The New York and New Jersey Telephone Company wished to erect a line of poles in front of this property and was met with an injunction proceeding. A temporary injunction was granted, but on motion of the parties to continue the injunction in force the special term of King's county denied the motion. The case was then carried to the Supreme Court, appellate division, second department, where it recently came up for hearing. Two cases in the New York decisions furnished the basis for argument between the contestants. In one known as the "Eels case," found in the 143 N. Y. 133, it is said that a corporation seeking to obtain practically what was sought in the present instance had no right to appropriate any portion of a rural highway to its own use by setting up poles therein for the purpose of supporting telephone or telegraph wires without the consent of the adjoining owner, or had acquired the right by condemnation proceedings. In the "Castle case," found in 49 appellate division 437, the court held as follows: "An abutting owner of a city lot is not entitled to damages, even though his fee extends to the middle of the street, for the laying of an underground telephone conduit in pursuance of a city ordinance, since such a use of the street was for a public convenience, and did not prevent its use as a thoroughfare." In a citation from a decision by the Missouri

courts in which there was objection by city property owners to the erection of poles the court said: "Poles do not impose additional burdens upon the easement in the street." In these last two mentioned cases it will be noted that the question arose in city streets. In the "Eels case," however, the question arose on rural highways. The decisions in the two situations, it will be noted, are directly opposite; in one case holding that damages are recoverable, in the other that they are not recoverable. City streets are considered insofar the property of the general public that an abutting owner has no claim for damages on the mere ground of the poles being in front of his premises, while in the instance of rural highways the owner of the roadside may object to the work of the telephone company and may prevent the use of the highway in which he has the fee until damages are awarded, either by after agreement between the parties or by condemnation proceedings. In the trouble over the erection of the line on "Bell Avenue" at Bayside, the case as it went to the Supreme Court was indefinite in that the record did not determine the fact whether the suburban streets of New York at this place should be considered rural highways or city streets. The court remarked that as much of the area now included in the jurisdiction of New York city is little else than rural communities that there is an open question to be decided by a test case to determine the class in which these suburban streets belong. The Supreme Court sustained the order denying the permanent injunction asked for by the plaintiff Weeks and sent the case back to the special term for trial upon the merits. The Supreme Court said that the question of the class in which the suburban streets belong could be decided by an appeal from the final judgment of the lower tribunal. Judge Hirschberg dissented from the prevailing opinion and said that either in urban or rural streets the erection of telephone poles is a use for other than street purposes and may be enjoined by the owner of the soil.

Weeks v. New York & N. J. Tel. Co., 83 N. Y. Supp. 678. Decided July 24, 1903.

WHAT THE TELEPHONE WILL DO.

A great deal has been said about the value of telephone service to farmers. The Charlottesville *Chronicle* sets forth its advantages in a clever way. The article might be used by those soliciting farmers to put in telephones, and is subjoined:

"Have you ever thought how many hours out of every week can be saved for yourself, your family and your teams by the assistance of the telephone? Have you ever calculated the minutes that can be gained in case of sickness or business emergencies? Have you ever thought of the dollars that you might gain were you only in close touch with markets? Can you conceive the pleasure to be derived from having in your home means of immediate communication with relations, neighbors or friends, though situated miles away?

"The telephone will pay for itself by getting better market prices.

"It will save several dollars every month by avoiding needless trips to town.

"It will deliver and receive telegrams and important messages immediately and without extra expense.

"It will keep you informed on weather predictions.

"It will order repairs instantly when machines break down.

"It will do the visiting and make social calls without the trouble of 'dressing up' and making a dusty, sultry or freezing ride.

"It will get a doctor on a moment's notice, and maybe save a loved one's life.

"It will get election returns as soon as they are in.

"It will keep away insolent tramps and prowling burglars.

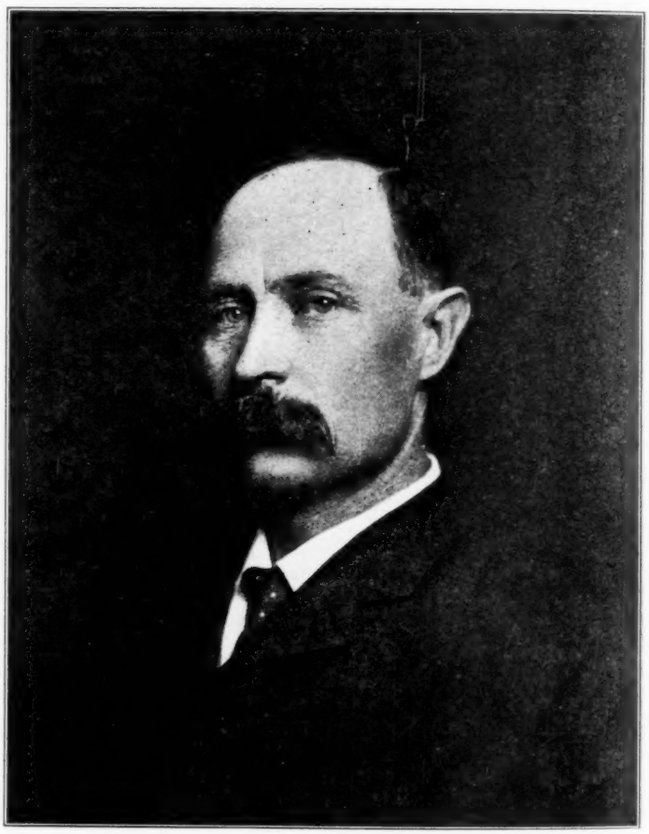
"It will keep the boys on the farm and also the daughters.

"It will make homes happier, brighter and better and more delightful in a thousand different ways.

"Progressive farmers throughout the country are installing telephones in their homes and in the near future every agriculturist will have a direct means of communication with the outside world."

DEATH OF HENRY C. RANEY.

Henry C. Raney, ex-president of the Interstate Independent Telephone Association, died at his home in Fairfield, Iowa, on August 21, the funeral being held on August 23 at Fairfield. Mr. Raney was born in Jefferson County, Iowa, December 11, 1856, and had always lived in Fairfield or its immediate vicinity. He was educated in the common schools



HENRY C. RANEY.

and at Parsons College, Fairfield. In 1884 Mr. Raney was admitted to the bar, practicing until the time of his death, and was a member of the firm of Raney & Simmons. Mr. Raney became deeply interested in telephone matters, especially those which related to Independent systems. About eight years ago he organized the Jefferson County Telephone Company, of which he was made president. When the Interstate Independent Telephone Association was formed in Chicago in the spring of 1902, Mr. Raney was elected its first president. He had also served as president of the Iowa Telephone Association, and at the time of his death was a member of the executive committee of that body.

Mr. Raney was a man of strong personality, sincere of purpose and simple in his manner of living. He made many friends, who will mourn his loss.

I have received TELEPHONY regularly the past twelve months, and it grows better every issue.—R. Wagener, Potsdam, N. Y.

Independent Telephone Systems.*

By J. J. NATE

In dealing with the telephone situation throughout the Northwest, and this, by the way, is a territory which has rapidly grown strong in the Independent field, we have a somewhat different condition of affairs to deal with than we find in the more central Eastern and Southern sections of the country. In 1893, with the expiration of the Bell patents, this entire territory, representing at that time three million inhabitants, knew but very little of the benefits which the telephone could bring to them. This statement is to be more readily appreciated when we take into consideration that the Bell companies were operating at that time exchanges only in the larger cities. In Minnesota, for instance, Duluth, West Superior, Minneapolis, St. Paul, Mankato, Crookston, Moorhead, Breckenridge, Winona, Fergus Falls and a limited number of smaller exchanges, farm and toll line service was entirely unknown. About the only toll lines in operation at that time connected Duluth and West Superior with Minneapolis and St. Paul, with a connection to Mankato, eastward to La Crosse and Winona, and a line extending through into Iowa, connecting Sioux City, Yankton and other points.

Beginning with the activity of the maufacturers, and of the many efforts put forth to build up a market for their product, the demand for telephone service throughout the Northwest was created, which speedily resulted in the establishment of hundreds of Independent plants, the result of which was that 1898 and 1899 saw an installation of Independent apparatus in full operation in every town and city throughout the territory having a population of 1,000 or more, and to-day the service is so wide-spread that towns of 300 and upwards are equipped with Independent apparatus. In North Dakota the condition, so far as telephone service was concerned, was even worse. North Dakota practically knew no telephone service until the beginning of the Independent movement. A few of the larger cities, such as Fargo and Grand Forks, may be considered as the only points equipped for telephone service. In South Dakota the same condition of affairs existed, and the cities which at that time were equipped with Bell apparatus may be counted on one's fingers, among which may be mentioned Sioux Falls, Canton, Yankton, Brookings, Deadwood, Lead City, Mitchell and Watertown. The average of telephones installed, under the old Bell regime, was about one telephone to every 100 inhabitants. With the development of the Independent work, this average, taken throughout the three states, approximated a telephone to every twelve inhabitants. From the fact that the Northwestern Bell company had not established exchanges in the more prominent middle-sized towns, the organization and installation of Independent plants progressed rapidly. The competition question was not raised, and the rates adopted were those which the Independent people had established in other states, but the rates are unquestionably too low in many instances. Knowledge, with regard to the growth of these properties, no man possessed, and the history of these states has been a duplication of the Independent movement everywhere, the rapidity of increase outgrowing all estimates and provision made for the future. The people were so glad to obtain this service, and so fully alive to its benefits, that toll line service was not considered of great value, and it was not until after the many towns were thoroughly equipped that this factor in telephone work began to assume proportions which required attention. It was at this time that many of the operating companies, appreciating the fact that extensions as regards local service were using up the earnings, decided to purchase and consolidate in groups various exchange interests, also to construct toll lines from point to point. Perhaps in the three states there may be a dozen such combinations, and I have learned that the toll line earnings have made ample returns, and held the properties at their true value.

In the state of Minnesota there are about 140 towns and cities having a population of 1,000 or more, all of which are fully equipped with Independent exchanges. There is hardly a town of 500 and over which has not in operation a telephone plant. The Bell company is strongly entrenched at a few larger points, but franchise privileges have been sought even in these towns, and will, no doubt, ultimately be granted.

In North Dakota there are twenty towns and cities having a population of 1,000 or more, and, with the exception of two or three, not one of these towns knew the benefit of telephone service until the expiration of the Bell patents. In South Dakota the same condition existed. In dealing with this territory it is to be regretted that its vast possibilities did not sooner appeal to eastern capital and investors in telephone properties. The towns in this territory are dependent upon the farmer, and for many causes have not shown as much energy in a general movement against the Bell as their brothers in the central, eastern and southern states, who have waged a successful fight for better and cheaper telephone service. The Bell company in the northwestern territory began to cover the territory with toll lines, connecting with Independent exchanges, which gave the company advantages which could not be secured over its own lines. This, to some extent, retarded advancement in the way of Independent toll line construction. These conditions, however, have changed, and toll line construction in the Independent field is going forward to an extent, and with capital back of it, hardly appreciated by the enemy. The organization and work of the Tri-State Telephone & Telegraph Company, together with the Consolidated Telephone and Telegraph Company, Minnesota Valley Telephone Company, and some twenty smaller companies, has planned to cover, and, in fact, has partially covered, the entire state. Trunk lines are being constructed, leading from the Twin Cities to La Crosse, by way of Faribault, Owatonna, Austin and Winona, by way of the Minnesota River Valley to St. Peter, Le Sueur, Mankato, Windom, Madelia, Worthington, Sioux Falls and Sioux City; to Duluth, West Superior, Ashland and intermediate points in Wisconsin.

Grank Forks and Fargo are to be reached by two routes, one by way of St. Cloud, Sauk Center, Fergus Falls and Barnesville, and the other by way of Litchfield, Willmar, Benson, Morris and Breckenridge. From each of these main lines branches are under course of construction, or will be in the near future, which will fill in the gaps across country, taking in on their routes the principal towns. From the fact that the Northwestern Bell company is operating the main trunk line systems, many contracts were signed by the Independent companies for toll line service, some of which have expired, others are about to expire, and a large number still continue for several years. The people, however, are being educated to the unfairness of the conditions usually implied, and are repudiating contracts for this service very generally. People who have invested their money in an exchange hardly feel like turning it over at the ex-

*This is the sixth paper in this series.

piration of a term of years, providing it is making a fair profit, and the Bell people want it, or being compelled to retain it after the property has been milked dry. The contracts submitted offer uniformly the same inducements, and demand the same sacrifices, but are not insisted upon in strict accordance therewith. There are certain exchanges, which the Bell people require in this service, where decided concessions are made. There are some instances where the Independent operator has felt a weakness, real or imaginary, and has often conceded all things asked by the Bell. In the larger cities, where there is a dual service, the Independent people are, without exception, furnishing the most satisfactory service, endeavoring to please their patrons, and have reduced the rates to nearly fifty per cent of the old rates prevailing under the Bell monopoly. Many properties are grouped, and the Independent investor has found this to be a most satisfactory method of producing financial results. The stock in these combined interests is distributed, as a rule, and the co-operation in the matter of telephone service is found to be beneficial. A few of the stronger organizations are given, with a list of the principal towns served:

Minnesota Central Telephone Company, with headquarters at Willmar, in addition to many toll line stations, incorporate in their system: Willmar, Granite Falls, Appleton, Ortonville, Wheaton, Wadena, Eagle Bend, Redwood Falls, Sleepy Eye, New Ulm, Atwater and others.

The People's Telephone Company, with headquarters at Chatfield, incorporate in their system: Chatfield, Spring Valley, St. Charles, Stewartville and Rochester.

The Blue Earth Valley Telephone Company, with headquarters at Winnebago City, are operating in Blue Earth, Winnebago City, Wells and other points, operating in conjunction with the Fairmont Telephone Company, who operate in Madelia, Louisville, Fairmont and other nearby towns.

The Southwestern Telephone Company, with headquarters at Pipestone, have operating exchanges in Pipestone, Windom, Marshall, Tracy, St. James, Canby, Minneota, Slayton, Madison, S. D., and other points.

The Iron Range Electric Company operate exchanges at Crookston Ada, Bemidji, Cass Lake, Grand Rapids and other points.

The Independent Telephone Company of Alexandria operate at Alexandria, Brandon, Evansville, Home City and Kensington.

The Fergus Telephone Company operates some sixty exchanges and toll line points, through Northern Minnesota and Dakota, among which the more prominent are Fergus Falls, Breckenridge, Preston and Hankinson, N. D.

In South Dakota, the principal company operating along these lines has headquarters at Aberdeen and controls and operates many of the principal exchanges in that territory and many hundreds of toll and farmer lines. Another system which has grown to immense proportions during the last two years is the Red River Valley Telephone Company's properties, with headquarters at Buxton, N. D. This company owns and operates exchanges at Buxton, Reynolds, Hatton, Northwood, Thompson and smaller points, in addition to which it has installed, during the present season, upwards of 600 instruments for toll line and farmer service exclusively. It is at the present time extending its lines in every direction, and before fall will construct an additional 100 miles, which will give it connection with Grank Forks, where an Independent exchange is shortly to be installed by the Tri-State Telephone & Telegraph Company.

In view of the fact that the telephone work of the Northwest has been purely that of the Independent operator, comparison with the subscription list of the Bell company is not possible. The average of growth, however, has been quite as pronounced, and the number of telephones per capita equals that of other states in which competition has existed. Perhaps if the average were taken together, the results might be even more gratifying were it not for the fact that the number of telephones per capita is largely dependent upon rural exchanges and farming communities.

The growth is necessarily slow, and telephones some distances apart, still the three states in question, with a population of three million, can probably claim at the present time from 150,000 to 200,000 telephones in Independent service, or a telephone for every twenty of its inhabitants. I have traveled this territory very thoroughly, and find that as a rule those cities which range from 800 to 2,000 people, are equipped with telephones one to every ten or twelve inhabitants.

To list the names of the towns would be a waste of time. By consulting the map of the states in question, following the railroad lines, and selecting almost any point, or any town of 700 or over, it will be found that a telephone exchange is now in operation and has been for some time.

The last year has brought forth pronounced inquiry for more modern and up to date apparatus. What few towns that are left still to be equipped are already agitating the subject, and, with the close of another year, there will hardly be an individual west of the Missouri River, on the Canadian line, who cannot converse by telephone with any point throughout the Northwest territory, to say nothing of opportunities which will be afforded for long distance service over Independent toll lines throughout Iowa, Wisconsin, Illinois and adjoining states. To the investor in telephone properties I suggest a most careful inquiry into this territory, as an outlet for capital and conservative investment. The people, as a rule, are well-to-do, are willing to pay fair rentals, and, above all, are loyal. I consider there is no better part of the country for the telephone promoter at the present time than the states of Wisconsin, Minnesota and North and South Dakota.

KENTUCKY TELEPHONE ASSOCIATION MEETING.

The executive committee of the Kentucky Independent Telephone Association met in Lexington on September 18 to decide upon the place and time for the annual meeting of the association. There were present at the meeting: President Dwight L. Pendleton of Winchester; J. A. Armstrong, president of the Louisville Home Telephone Company; A. H. Bastin, president of the Bastin Telephone Company of Lancaster; R. H. Bishop, president of the Cynthiana Telephone Company, and James Maret, secretary of the association, from Mt. Vernon.

The claims of various places, including Bowling Green, Paducah and Maysville, were considered, and it was finally decided to hold the meeting at Paris on Tuesday and Wednesday, October 13 and 14.

The association met in Owensboro year before last and in Louisville last year, so this year it was thought fair to have it meet in the Blue Grass, and Paris was selected. Paris has one of the newest and probably the best telephone exchanges of its size in the country, and the company is one of the strongest companies in the state, being composed of the leading men of Bourbon county.

There are now between sixty and seventy Independent companies belonging to the association, which have between $2,000,000 and $2,500,000 invested in telephone exchanges.

The program for the annual meeting was arranged at the meeting of the executive committee, but will not be made public until those who will be asked to read papers have accepted.

In 1894 there were nine telephone companies in Ohio with a valuation of about $2,000,000. The immense growth of this business both in cities and in the country is shown in the figures given out by the state auditor recently, which show that there are now 284 companies with a combined capitalization of between $10,000,000 and $11,000,000.

INDUCTION

J. C. KELSEY

If a line is noisy, the average chief inspector will at once ascribe the trouble to induction, and if the receivers of the exchange operating sets are noisy from the transmitter battery charging machine, the chief operator satisfies herself that the trouble is due to induction. Both are satisfied with their conclusions, giving induction the reputation of being a sin rather than a blessing. Which one is right? The chief inspector is nearer right than the chief operator, although both have wrong ideas. Unfortunately, the telephone industry is so new that distinguished bodies of men have not had time nor incentive to deliberate, and form a set of standard guiding rules for the true expression of telephonic terms, hence the inevitable confusion. What is induction, and to what action of electricity shall it be ascribed? A few observations of the simpler forms of induction may be of benefit.

The term induction was originally used to express any electrical action coming from a distance through the air. In contrast with it is the expression conduction, which means electrical action coming through actual connection by wire and earth. But it is now used, in the light of recent discoveries, to express certain electrical actions, coming from very short distances, with conductors as close as possible without actual metallic connection. One action which may be properly ascribed to induction is that effect of producing current by moving a magnet in the near proximity of a closed coil. It can be realized in a receiver, which effect is virtually this one. And also the generation of current in a secondary coil by means of passing current through a primary coil. This effect is the result of induction. So, therefore, the term induction has been officially sanctioned as applying to that effect which produces electrical currents.

Before going further, let us inquire into chief inspector's conclusion that induction is to blame. Is it a fact that his line is noisy because currents are induced in it? If so, then induction is to blame. But it has been demonstrated and proved that one transposition in a metallic line, that is, a balanced line, will entirely eliminate any possible chance of induced current flowing in that line. It cannot be induction then. But one transposition will not dispel cross talk and noises of trolley cars, and other kindred noises, but that trouble is due to what is wrongly called electrostatic induction, which should be called electrostatic influence, and not induction, for no currents are produced. There only exists the influence of charges, and pressure changes, of one circuit upon the other. If the telephone line parallels the trolley line, which is perfectly well insulated, the subscriber will hear the running of the power station machinery, the starting and stopping of the cars, when every car is between his line and the power house, and not a particle of current is flowing in the trolley line. Or even when no car is running on that division at the time. No current flowing in the primary, or the trolley, therefore no current can flow in the secondary or the telephone line. It cannot be induction then. But the subscriber hears the noise through electrostatic influence, for we know that the pressure of the trolley is constantly fluctuating, never constant, and the potential of charge on the telephone line varying in the same proportion as the change of pressure on the trolley line. It is simply a case of influence of a charge of one body upon another.

In switchboard practice, the line drops have to be enclosed by a casing unless both terminals of the drop are entirely cut off by the entrance of the plug. If one side only is cut off, and the drops are without casings, cross talk will exist. No current can flow, because the drop is open circuited. According to the term, the trouble is not due to induction. A charge exists on the drop winding which influences the neighboring drops proportional to the varying potentials of the voice currents that exist in the circuit proper. The noise in the operators' receivers during the charge of the battery is neither a case of influence, or induction, but a plain case of conduction. The current passing through the transmitter from the charging dynamo is not a smooth one, and, of course, the transmitter picks it up, and the receiver interprets it. So the proper conception of induction is that electrical action taking place in which lines of force are cut, and current produced, or induced therefrom.

It was not more than seventy years ago that Michael Faraday made the discoveries that are so vital to telephone practice. He discovered that by moving an electromagnet near a coil with a galvanometer in the circuit, a current was produced which visibly affected the galvanometer. If the magnet was introduced into the hollow of the coil, a current was generated, which acted in a direction that would cause a polarity opposite to that of the magnet. The withdrawal of the magnet from the hollow of the coil induces a current in the opposite direction, and which causes a polarity similar to the magnet. It showed that the current due to withdrawal has a greater pressure than the current due to introduction of the magnet. Most everyone knows that the shock of a make is much less than that caused by the break of a circuit containing a battery and a coil with an iron core. An alternating current practice of to-day simply consists of passing closed loops of wire in the vicinity of an electromagnet, thereby cutting lines of force, and inducing positive and negative currents. The very foundation of dynamo design rests upon the number of lines of force cut per second. One has to cut 100,000,000 lines of force in one second's time to induce one volt, and one can easily imagine a dry cell as representing 150,000,000 lines of force cut in one second. Knowing the number of lines for one volt, it is then an easy matter to design a machine when the revolutions of the armature per second is known, and the number of closed loops, or conductors as well. We would have the voltage desired multiplied by 100,000,000, divided by the speed, multiplied by the number of armature conductors equal to the total number of lines of force to be generated.

Faraday also discovered that when a current is passed through the primary winding of a coil, a current will be induced in the secondary winding. He is virtually the inventor of the transformer, the repeating coil, and the induction coil. The induction depends upon the nearness of the two coils, the character of the core; but virtually is the same as the dynamo, which depends on speed of cutting the lines. The inductive powers may be increased in such a coil by making the core a bundle of soft iron wires, thereby decreasing the eddy current effect, which retards the rise and fall of magnetism in a coil containing iron. The potential of the secondary to that of the primary is a ratio of the comparative number of turns. If the primary receives 100 volts, with 100 turns, the voltage of secondary will be 1,000, if 1,000 turns are in the secondary.

Just a word about the casing of the line drops mentioned above. If we interposed a piece of glass, or wood, or paper, between two drops, or any kind of coils, cross talk would result. It would make no difference if each drop was en-

closed in a glass tube vacuum. A screen of iron is the only effectual material. The drop being enclosed in a cylindrical shell is magnetically shielded. Because the stray lines of force strike the casing, and are deflected. It acts a great deal like the shadow of an arc light. One can easily notice that the arc light pole throws a black shadow, which increases in size as the distance from the pole increases, and the light never seems to get behind that pole as would ordinary light. So the stray lines are deflected, and return to their own field without having a chance to penetrate the core and coils of the drop.

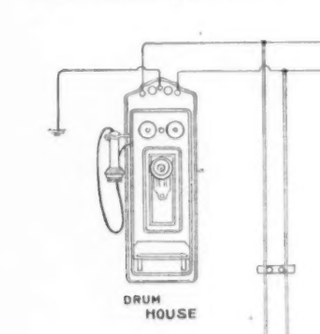
There are many other applications of induction, but space forbids their discussion. Enough has been said for the thinking technical workers of the telephone industry. It is to be hoped for a fuller and a freer discussion of technical matters. Right or wrong, any idea or suggestion toward the final standardization of telephone terms and meanings is valuable.

The Mine Telephone and Its Advantages.

F. L. MARTIN.

The use of telephones in mines is not of recent origin, but it is only within the last few years that they have been used to any great extent. Their use formerly was confined to landings in deep shaft workings, but with the advent of the Independent telephone their use has become much more extensive.

The advantages derived from the use of telephones, like many other recent discoveries and developments, are not really appreciated until they have once been tried. The character of a mine largely determines the extent to which it is economy to install telephones, but even in comparatively small operations, the results shown warrant their use in every case. Systems as small as three telephones have been installed. In deep shaft workings, their use is indispensable, and the mining laws of many states require their use under certain conditions. Aside from these conditions, many mines have been equipped throughout with telephones where they are not used as a safety appliance, but simply as a matter of economy and convenience, which, of course, means dollars and cents to the operator.



It has been the practice of most companies to install telephones at all the principal centers inside the mine, and connect up with an outside system, which reaches the power plant, drum house, office of the superintendent, etc. A simple means of doing this, where only a few telephones are installed, is shown in the accompanying diagram. In case of accident of any kind, by the aid of a telephone, a report can be sent outside immediately, and the superintendent is notified of it without delay. As frequently happens, a large force of men are required to make repairs or straighten out the difficulty, and they can be dispatched immediately to the point where their services are most needed. In addition to this, the superintendent being familiar with the exact nature

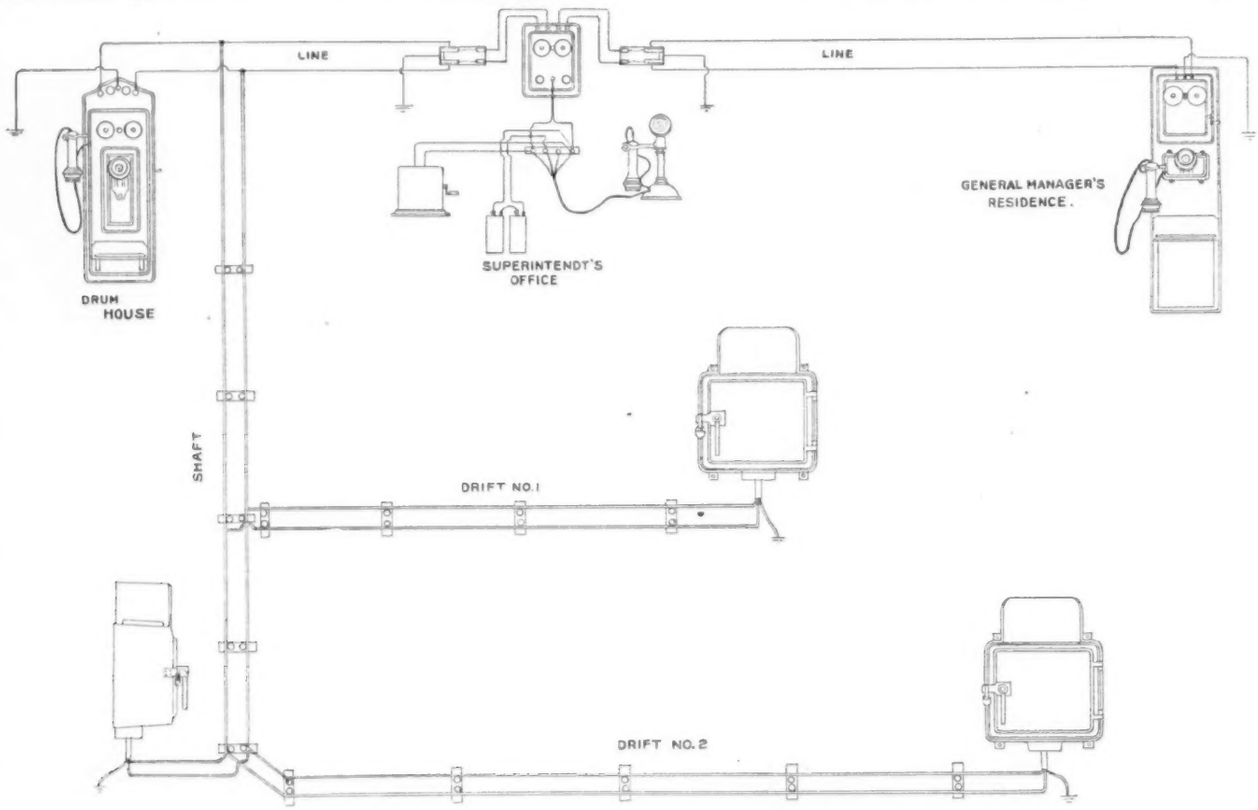
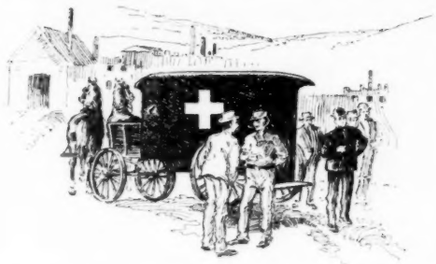


DIAGRAM OF MINE TELEPHONE SYSTEM.



of the trouble, can send such tools or appliances as are required, thereby obviating any delay. In case of injury to an employe inside the mine, word can be telephoned outside, and by the time he arrives on the surface a physician or ambulance can be in waiting. Knowing the nature of the injuries, the man in charge of the mine on the outside is able to make any arrangements the necessity of the case may require, and by so doing avoid vexatious delays at a time when expedition is especially sought.

Another important item in connection with having telephone service in the mines is the saving effected by being able to notify the men in the different parts of the mines of an unexpected shut-down for any cause. Many operators have told us this saved the cost of their telephones the first six months. The telephones are built to last a lifetime with an occasional new dry battery. It is a well-known fact that the operation of most mines is dependent upon a variety of uncertain conditions, such as scarcity of cars, break-downs of ventilating machinery, power houses, etc., rendering it impossible to anticipate a temporary suspension of work in advance of its actual occurrence.

This is especially true in the case of coal mines, as the men in these mines are usually paid by the hour and will naturally remain at their post of duty until notified to suspend work. The fact that a man in charge of a mine can remain in a central position and being in direct communication, can personally direct the work, is an item worth the consideration of any man.

The cost of constructing a line underground is usually less than outside, due to the fact that no poles are required and there are no holes to dig. The wire can be supported directly from the roof of the mine or from any timbers that might be encountered, using porcelain or glass insulators. In a large number of mines, rope haulage is used to bring the ore to the surface, and where such is the case, a metallic signal line is usually run along one side of the entry to transmit signals to the engineer. Where such a condition exists, it is only necessary to connect any number of bridging telephones to the circuit. In this case, no expense is incurred beyond the first cost of the telephones and the cost of connecting them up. The expense of maintenance is usually very light, as the lines, being underground, are not subject to atmospheric conditions present outside, and trouble from lightning is unknown.

It is advisable to use rubber covered wire for all underground circuits, which are in any way subject to moisture or dampness from contact with timbers, etc. Lead-covered cable, of course, is the best thing to use, if the installation will warrant the expense. This part of the equipment should not be slighted, and the best is usually the cheapest and certainly will give much more satisfactory service.

ADVERTISING THROUGH THE TELEPHONE.

The ways in which a telephone can be utilized to advertise has been forcibly shown by a merchant in Fairmont, Minn. In speaking of this class of advertising the merchant said:

"Every town has a class of trade that thinks the home stocks are hardly good enough, and when they want their choicest merchandise they get aboard the train and visit the nearest metropolis. Several times in the past we have planned special sales in order to catch this very class of people—the bon ton—but have always suffered defeat in a greater or less degree. Not so long ago we arranged to have a representative of a high-class manufacturer of suits and waists visit our store for a short period. We asked him to bring a line of first-class goods, which even the swell trade could not find occasion to find fault with. When he arrived we telephoned every woman in town whose trade we had had trouble in winning for their best apparel. They listened to our argument, and in nearly every case promised us over the telephone to look over the line of samples. Women enjoy seeing nice things, and after we had notified them they seemed willing enough to pay our store a visit and examine what we had to show. The result of our efforts was to sell more to the bon-ton trade than we had ever been able to at any past time. We attribute success to the telephone, as we were able to talk personally with the lady we wanted to visit the store, and she could not well do otherwise than consent to at least see what was being shown. After we had them in the store they found it a hard proposition to do anything else than buy if they were in need of garments. By the old way of advertising we could not secure an acceptance of our invitation to look over the line. Letters required physical effort to answer. Personal visits by us to the home of the desired customer were hardly possible. Sending clerks or errand boys does not result in so much effective returns. The object is to secure a positive acceptance or declination from the lady herself by one of the firm. The telephone does this in a more successful manner than any other plan we have ever tried."

It may possibly interest the readers of TELEPHONY to know that at least one couple "way down in old Kentucky" are happy, though married. Mr. Smith, at this place, is as deaf as a stone, yet he is a telephone subscriber and finds his telephone to be a great convenience. He and his wife live alone, and it may be remarked here that she has lost the use of her tongue and can't utter one word. This is the way they use the telephone: Smith rings up, his wife taking the receiver and indicates to him that central is answering. He calls his party and then begins a three-cornered conversation. His wife listens and indicates by signs what is being said, and in this way he orders his beefsteak and sells his hogs.—J. M.

The Economy of Time.

Paper read at the Eighth Annual Convention of Municipal Electricians, by Henry W. Pope.

Since my last talk to the members of this association at the Niagara Falls meeting, the use of the telephone has increased to enormous proportions, establishing itself as an absolute necessity in business as it is conducted to-day. To January 1, 1903, there were upwards of 1,277,983 stations in operation in the Bell system alone, using the service, on an average, of 7 3-10 calls per day per station, or 3,002,000,000 times yearly.

This growth may be attributed to a number of perfectly legitimate causes, but the perfection to which the service has been brought by the installation, almost regardless of expense, of what is known as the common battery or central energy system, may be regarded as one of the most potent reasons. Calls are made with more ease and convenience, and the ten seconds previously consumed in reaching the operator's ear is now reduced to three seconds, and the disconnection period to even less time, while the liability of errors and the causes for complaint are minimized.

If the past century is to be credited with one thing more than another, it is the wonderful progress that has been made and the results accomplished in the saving of time and labor, by the invention of devices and instrumentalities in more ways than it is possible to enumerate or comprehend. Those engaged in the electrical field and more familiar with its development, are apt to argue and maintain that the greater progress has been in electricity, and this may be true, but whether the resultant benefits to mankind are greater is open to question.

Of the telephone it has been said by a most competent observer: "There was never a greater invention than the speaking telephone." Mr. Lockwood, in a discussion last January before the Institute of Electrical Engineers, referred to the observations of an orator in Washington in this wise: "That while he felt that he could get upon familiar terms with a dynamo at a respectful distance, and while to some extent he could appreciate the electric telegraph as being something which even he was capable of measurably understanding, when it came to the telephone he was stricken with awe, for, as he said, while we have it on the authority of the Master that none of us by taking thought can add one cubit to his stature, Alexander Graham Bell, by taking thought, had added not merely a cubit, but hundreds of miles to the length of our tongues and ears."

The telephone, in whatever direction it has been applied, has filled a long-felt want, providing a quicker, and if you will pardon the egotism, a superior grade of service. The telegraph, on the contrary, while maintaining its position as a means of transmitting intelligence rapidly, has not, so far as the ordinary sender of a commercial telegram is concerned, made any visible progress in the speed of transmission and delivery since the days of '65, except such as may be due to the typewriter and bicycle.

Passing to the reception and delivery of the telegram, it would seem possible to provide a blank form for the reception of the typewritten message, which would admit of being folded and sealed to show the address, eliminating the necessity of an envelope and the labor, time and expense involved in providing and addressing it; or an envelope with a space cut out of the face side, and covered with transparent paper, so that when the telegram was properly folded the address would be visible from inside the sealed receptacle. In filing the telegram for transmission, the sender should be asked to elect whether the delivery should be by messenger or telephone, and this indicated by some character or symbol would be the authority for the distant office. Every business man, every business office or factory of any account in the United States has a telephone, and this will be true to a considerable extent with residences and farms in the near future. As the public were apprised of this feature, the messenger would be gradually relegated to other fields of industry, and the greatest element of delay eradicated.

If the same studious interest were employed in minimizing time somewhat along the lines I have suggested, in the telegraph business as in the case of the telephone, it would unquestionably lead to an enormous increase of telegraph business revenue. You, gentlemen, represent special fields, and fields in which economy of time and accuracy of information are important factors. What are a paltry 500 fire alarm boxes in a city for emergency use as against 15,000 telephone stations?

You will contend, I presume, that it would be the height of folly to throw this telephone system open to the public for emergency purposes because of the average person's excitability, but bear in mind the average person has only to take down his telephone and talk; an excited individual usually can talk—his excitability makes him talk too fast—that's all—but it's not too fast for the telephone, and you have the opportunity to verify your information as you cool him down. If in his excitability he pulls a box which a more collected person would not do, you have no means of recalling the act—the signal is in and the trouble commenced. To arrive at a condition of things which would admit of encouraging and advocating the use of the telephone for emergency purposes, you must first put your house in order.

My experience is that municipalities economize in everything essential and squander in non-essentials. They economize in the use of telephones to the extent, generally speaking, of disgusting every telephone user through inability to get a connection. A city telephone is pretty generally "busy," and its value or influence should only be considered as a means to get out of doors. The possessor of a telephone knows who and what he can reach himself, but he forgets and is unmindful of the other fellow that wishes to reach him. Sufficient terminals should be provided, especially for emergency purposes, restricted absolutely to inward business; then people, finding always an inward path, will grow more and more to use the telephone. This will reduce the office labor, because telephone conversations are short. The telephone saves time, as I have said before, in whichever way you look at it.

The proper solution for these increased facilities is the installation of a private branch exchange, which provides you with ample trunking facilities beyond possibilities of congestion, ample telephones at a nominal charge, and a complete censorship, through your own operator of every connection.

The theory generally prevailing that the multiplicity of telephones is a bother and nuisance because one can be called up at all times and upon all sorts of matters is incorrect. Telephone conversations, as experience teaches, last but a few seconds on the average. If a person has business with you, he will either congest your office and business with his presence or write you a letter which will involve time and expense to answer. Whereas, if it is convenient to reach you by telephone, you have the advantage of dealing with him at long range, with extreme brevity.

and the expression of your countenance cannot be discerned to your disadvantage.

The inquirer will not drift off into politics or extraneous matters; the conversation will start with the usual compliments and get right down to business. More and better business in the ordinary transaction of affairs can be handled by telephone and you are not disturbed in the quietude of your sanctum.

It does not follow that the installation of a private branch exchange involves increased telephone expense. Oftentimes a considerable saving can be effected by the elimination of high-pricd direct exchange connections and passing such service through the private branch exchange.

What delay there may be under existing conditions, and what unreliability may have been experienced in passing telephone emergency calls, is not unlikely due to one of these causes. (1) To the trunking of such calls from one exchange to another similarly to a subscriber's call. (2) To the lack of sufficient terminal facilities for the reception of calls. (3) To the want of perfection of detail and handling of call. (4) To neglect to systematically verify the information. Another feature I do not wish to overlook is the possibility of instantaneous conversation with all your suburban surroundings, with the chiefs of nearby and distant cities. You know the possibilities and advantages of this service and are familiar with its reliability in comparison with other means of communication.

The signal system has many good points, but it is limited to its accessibility, and hence slow to accomplish certain results. It lacks elasticity and involves spending two dollars where only one is necessary. It may be a radical suggestion, but receive your calls by telephone and send out your companies singly or in pairs, by signal. It will come to this eventually, and every telephone subscriber will send his emergency calls by telephone and forget there ever was a fire box and the subscriber will do this because of his having already learned by experience that it is the quickest method on earth of communication. The subscriber also knows that he can complete his call to the fire department before it would be possible for him to get out the front door. He has used the telephone, figuratively speaking, 41 years, and it has failed him not once in that time.

The members of this association, I assume, are interested in any measure likely to enhance the value of the cities' protective measures to its citizens. You are closer in your relations to them than the employer of a corporation, serving the public for a stated compensation. The corporation caters to the many. You are the representatives of the voters. Anything you do to enhance their interests is likely to redound to your benefit, and it often produces a more reliable "pull" than the energies of any politician, be he Republican, Democrat, or Reformer. You should strive, therefore, to keep pace with modern developments. It is not well to sit back and assume, as they do in Europe, that because certain duties have been performed in a certain way from time immemorial, that there is no better or no improved way. Look about you—see what others are doing—experiment and convince yourself. Profit by the experience of the railroad companies; then handle the lives of people, as well as property. Note how they are developing the use of the telephone, while only a few years ago it would have been considered high treason to have moved a train by telephone. Other means proved too slow, and not sufficiently elastic for the purposes used. The emergency departments of some cities seem to have reached perfection; they are well up in discipline and in the economy of time, but this economy of time is in response to the receipt of the information and not in its inception and transmission.

A prominent fire department official of international reputation is authority for the statement that the "missing link" in the fire service of to-day is the time that elapses from the breaking out of a fire until the alarm is turned into the department. If he had dwelt upon this subject at greater length, he would have made it clear to you that the "missing link" was the telephone, because of its availability and accessibility and its suitability to convey not only the alarm, but any necessary particulars in connection therewith.

You are familiar with the drill and discipline which produces such surprising results in the dispatch of fire engines after the alarm is received. Apply the same energy in the collection of these emergency calls and you will obtain results that will surprise you. As I said before, some localities have thirty telephones to the hundred people; few have less than three and none less than five, eventually—make a mental calculation of the insignificance of your box system.

I will not take up your time discussing other possible advantages in the utilization of the telephone, although I might say to you that it is entirely feasible and practicable to utilize automatic telephonic devices in connection with the telephone exchange systems which would prove accurate and reliable and clearly in advance of the automatic auxiliary devices of to-day, but these attachments are objectionable from a telephonic point of view. So, there is, you will observe, a possibility that some day the midnight solitude of the fire department central offices will be disturbed by the clear and distinct announcement somewhat in the style of Hamlet's ghost: "Fire 41144—key under the doormat—beware of the dog."

In the excitement of the assassination of President McKinley at the Pan-American Exposition, the ambulance call was practically instantaneous, and the news was in nearly every important city in less time than I have consumed in dictating this. Yet there was no signaling system involved, and if there had been it would not have distinguished as between an insignificant injury to a laborer and that of mortal injury to the president of a great nation. There would have been no unusual exertion, but the words from the station in the Temple of Music, "My Good, the president is shot," thrilled and moved everybody to action. And all this in less time than would be occupied in the revolving of a circuit breaking wheel twice after you had discovered the box from which to transmit the signal.

Your experience teaches you that it would always be advantageous to know at the inception, whether the alarm is for a disaster or an ordinary emergency, and you know that minutes will elapse and valuable time be lost before particulars are available after the signal is received. In arriving at these conclusions, with reference to telephone possibilities, I have not intended to convey the impression that alarm boxes are passe or unsuitable for the conditions of to-day. There are conditions likely to continue as long as water runs and grass grows, which will be best to be met by street alarm boxes; for instance, in business districts at night or during holidays, but their value will be greatly enhanced if telephonic connection is established in time, that the officer on post may be in position to communicate information to the department, hospitals or elsewhere, as readily as the fixed signal. It is the combination that is advocated, and when provided, the encouragement of the public to use either facility and with equal consideration and confidence.

The longest telephone wire span in the world is 3,200 feet from pole to pole, spanning the Susquehanna river at Lancaster, Pa.

C. M. Martin of near West Lebanon, Indiana, is authority for the statement that a telephone is in "no danger of being burned out during an electrical storm provided a feather pillow is placed in the box." Mr. Martin does not state how it is possible to get a feather pillow in a generator box, or, what its protective properties are. So we will have to let it go at that.

Testing and Selecting Raw Material.

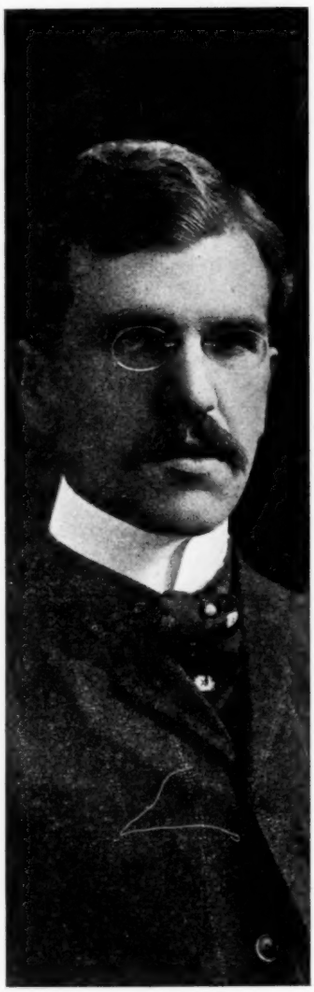
By H. M. DEAVITT.

While paper is used very extensively in the industries, it belongs to a class of materials rarely tested by the consumer, although in view of the variety of materials which are used in its production, and the large extent to which it may be adulterated, it is seldom that uniform results can be obtained without a true knowledge of its structure and composition.

In the insulation of telephone cables especially, it is necessary that the stock should be made as uniform as possible, that their capacity may be constant. For this purpose the paper should contain no metallic salts, or acids, or anything of a corrosive nature which will attack the copper wire.

In the selection of paper it is necessary to consider (a) the fibers which form its basis, and the treatment which they have received, (b) the materials which have been added to give weight, color or finish, and (c) special properties varying with the purpose for which it is intended.

The fibers used in the manufacture of paper are derived chiefly from the vegetable kingdom. From an economic standpoint they may be classified into primary and secondary qualities, the first including raw cotton, flax and similar material, fibers from palms and grasses and those obtained from such trees as poplars and pines, while in the latter division are found those recovered from the waste of spinning mills, from old ropes, rags, etc. Chemically they all have cellulose for their basis, but are seldom found without being incrusted with or containing within their pores, various compounds derived from the plant which produced them. The removal of these foreign substances is one of the great problems with which the paper maker must contend, and the more nearly this purpose is accomplished the better will be the quality of the product, providing that the stock has not been injured during its isolation.



HENRY M. DEAVITT.

Processes for reducing fibrous substances to a pulp have been made the subject for many patents, but the underlying principle has been little modified. They are usually boiled under pressure with various chemicals which have the power of destroying the soft substances of the plant tissue, and changing the material into a mass which can be easily broken up by the subsequent operation of beating. Bleaching is the next operation to which it is generally necessary to subject the stock, and for this purpose calcium hypochlorite, otherwise known as bleaching powder, is the agent most often employed. After the bleaching some of the powder remains in the pulp, and if it is not subsequently removed may prove injurious by corroding metals with which the paper comes in contact, or by acting on the paper itself, thus causing a decrease in its tensile strength.

The pulp is now ready for beating. The object of this operation is to secure an evenness of texture, and it is one of extreme importance. The pulp is acted on by a number of knives, which in the case of cotton and other long stapled material serve to break up the fiber into smaller pieces, while the filaments of straw and other fibrous substances whose ultimate fibers are short must be split up into thin constituents. If the beating has not been sufficiently thorough, the finished paper will contain numerous small bundles of fibers, and present a surface lacking in uniformity. The tendency for paper to tear or break along the edges of such bundles indicates the necessity for obtaining a paper as free as possible from such inperfections, especially where, as in some methods of insulating it is used in narrow strips and runs at considerable tension on the insulating machines. A further advantage of correct beating is derived in the case of long stapled fibers from the fact that the ends become more or less frayed by the operation, thus increasing their fetting power.

The subsequent processes to which the pulp, now known as "half stuff," is subjected varies greatly with the purposes for which the paper is intended. Some is sent immediately to the paper machines, but most generally it first undergoes the operations of loading, sizing and coloring. By the term "loading" is understood the addition of foreign substances to the pulp. It is not necessarily an adulteration, but is often practiced to a large extent for such purpose, and even then it is a matter which must be expected, as it enables the manufacturer to meet the demand for a cheap paper with some chance of remuneration for himself. China clay or Kaolin are the most common of the loading materials, the amounts added varying from a very little to 20 per cent or more of the total weight of the paper. The addition of small amounts of clay may even be looked upon as an advantage, as it serves to fill up the pores and improves the surface. If absorbing qualities are desired for the paper, the amount of loading should be carefully regulated, but otherwise need not be a matter of much concern. However, as weight is one of the factors which regulate the price of paper, it is certainly of importance to the consumer in selecting material to know how much foreign matter it contains.

Papers are "sized" chiefly to give finish and produce a smooth surface. The materials used in this operation are also of great variety, the most common being resins, soaps, starches and glue. The objection to the presence of these substances in paper intended for electrical work, or other purposes in which the quality of raw materials must be carefully regulated, lies in the fact that impurities are often present in the sizing, and these give rise to difficulties by causing variations in resistance or by corroding metals. Glue, especially, if it has not been treated with proper preservatives, is objectionable because of the great tendency to become infected with molds, bacteria, etc.

In coloring paper many of the aniline dyes are used and they are usually unobjectionable, except that they are not very fast color to light. Red oxide of iron is used to a large

extent in coloring the cheaper qualities of wrapping paper and pressboard.

In determining the quality of a paper it is necessary to subject it to physical, chemical and microscopical examinations, the two latter methods being frequently combined by conducting some of the operations under the microscope.

The breaking strength of paper is an item of importance, and if carefully determined may give much information regarding quality. However, it is a fact not generally appreciated that paper is not of equal strength in all directions. The strength determined in one direction may be nearly twice that determined in another. If the tensile strength of the paper used in insulating copper wire is not more than sufficient to withstand the tension of the rapidly revolving heads on the machines used in its manufacture, the breaks will occur often, which means not only a large loss of time in shutting down the machine to repair them, but also a considerable loss of material and an uneven product. In any one quality of paper, the thickness is the item most influencing the stress which a paper can withstand. For purposes of comparison it is therefore advisable to calculate results to the tensile strength of a square inch or other definite standard.

Elasticity is sometimes taken into account, as also resistance to crumpling. Paper is quite readily affected by the moisture contained in the atmosphere, and the amount absorbed may at times be sufficient to influence the results of the strength and other tests. The amount of moisture contained under ordinary conditions in a paper free from moisture attracting substances averages about seven per cent.

Chemical tests are applied to paper to determine the presence of chlorine or its compounds which might remain from the bleaching; the presence of soluble matter, chiefly salts, which may have been added for various purposes; the presence of free acid or alkali; the kind and amount of sizing and loading materials; and when necessary the dyestuffs used.

A microscopical examination is of the highest importance in determining the value of a paper, as by this method information can be obtained, not only of the kind of fibers used, but also of the treatment to which they were subjected, and to some extent the kind and quality of foreign materials added for loading or sizing. It is possible even to tell the condition of the knives in the beater by such examinations—information valuable in explaining defects and predicting the suitableness of the paper for various purposes.

Wood fiber is isolated for paper making purposes by two methods, the chemical and the mechanical. The pulp resulting differs much in quality and value, and while mechanical fiber is often substituted for the chemical, the microscope immediately reveals such practice. Word is also used to a large extent in adulterating paper supposed to be made of better fibers. Reference to figures 1 and 2, which are reproductions of photo-micrographs will illustrate the case with which it may be detected in such a mixture. Figure 1 shows the appearance of paper composed entirely of manilla hemp, while figure 2 is taken from a paper submitted by the manufacturer as being the same quality as the first. In view of the fact that several large wood fibers are prominently seen in the second illustration, it would have been folly for the manufacturer to insist on the purity of his product.

In making microscopical examination, a quantity of the fibers are isolated from the paper, care being taken to secure an average portion. The fibers are arranged on a slip of glass and permanently mounted by inclosing them in various transparent gums or jellies. The most satisfactory method for doing this appears to be that recently described by Chas. E. M. Fischer, who uses soluble glass as the mounting medium. To the skilled microscopist the examination of paper is a readily accomplished task, but one having no previous knowledge of the appearance of fiber when magnified, or who lacks the technique necessary for the proper manipulation of the microscope and its accessories, will meet with much discouragement and unsatisfactory results.

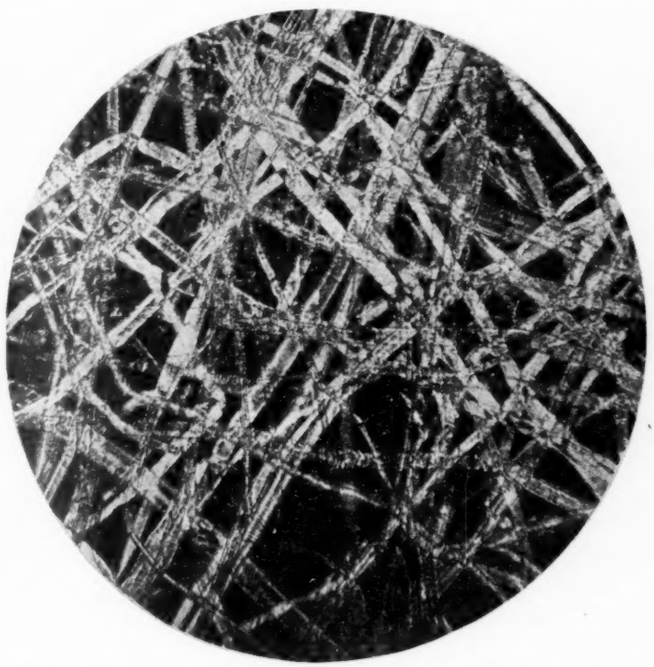


FIG. 1.—PAPER MADE FROM PURE MANILLA HEMP MAGNIFIED 225 DIAMETERS.

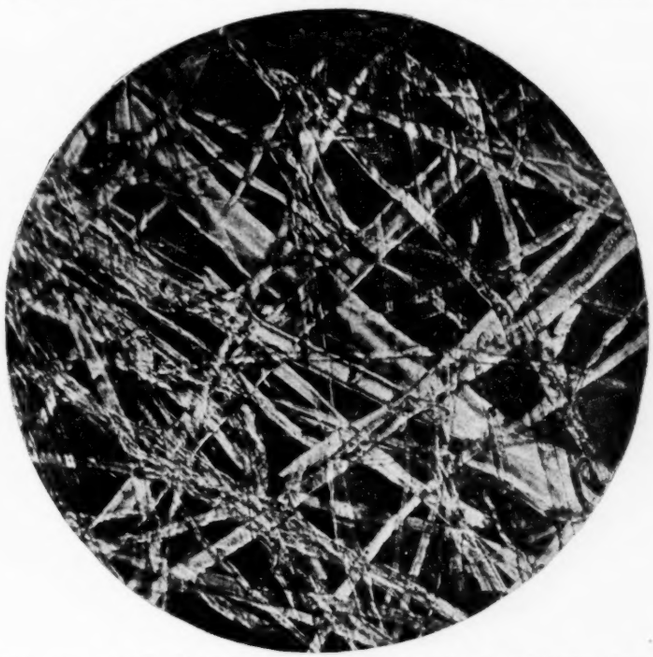


FIG. 2.—PAPFR MADE FROM MANILLA HEMP ADULTERATED WITH WOOD, MAGNIFIED 225 DIAMETERS.

Magnification in the neighborhood of fifty diameters is in many cases sufficient to identify fibers, but it is often necessary to run as high as 500 or even more, the larger magnification requiring greater skill to procure proper illumination and definition. In fact, so similar in structure are so many fibers that, as before mentioned, it is frequently necessary to combine chemical with microscopical methods for their differentiation.

Paper is usually looked upon as an item of small importance, and has generally been given but little attention. But in the electrical field in particular, it is found that it is only

by a constant watch of the minute details in the manufacture as well as a rigid inspection of the stock from which the paper is made that the most satisfactory results are obtained. For the best insulation, the pores of the stock must be well closed, which is accomplished better by care in manufacturing than by the addition of a large amount of loading. In the manufacture of condensers, the resistance may be increased if the paper contains foreign matter, and the presence of holes in the stock, however small, will allow a leakage of current.

In cable paper it is necessary to avoid the so-called slime spots caused by the remaining soft parts of a plant substance which has not been thoroughly destroyed, as these brittle portions are liable to break out.

It is a fact which many concerns are just beginning to realize that a large number of mysterious difficulties encountered in their process of manufacture are explainable by the unsuitable paper used for such work.

THE HELLO GIRL.

The hello girl may have her faults—we all have—but the writer will venture the assertion that no other one person is called upon to do so many favors in the same length of time, says the Elgin Courier.

The young lady who answers, number, please? whenever it is your pleasure to take down the receiver is supposed to know what John Smith's number happens to be, providing you don't take time to consult the directory or if that all-important book has become mislaid.

If she doesn't know it off-hand she finds out by consulting the list and in a moment you are connected with John Smith.

"Let's see, what time does that train leave for Chicago—2:30, I think—but I am not sure; possibly central will know."

"Yes, 2:30 on the east side and 2:35 on the west side," comes the answer from the unimportant (?) little lady who works long hours at the switchboard.

"Hello, central! Can you tell me whether or not there will be a band concert to-night?"

"No concert to-night—grounds too damp—postponed until Wednesday evening."

"Thank you."

"Oh, that's all right, you're quite welcome, I'm sure—good-by!"

"Good-by!"

—

And so it goes—not once or twice, but hundreds of times each day the hello girl is called upon to do things which by rights you have no reason to expect of her.

She is often asked the time of day—asked to tell those who call for a certain number that the party is out of town—asked to give a continued ring at a certain hour of night or early in the morning as the signal for a sound sleeper to awake and catch his train. All of these things and many more are expected, and the favors are generally extended good naturedly, with nothing more than an occasional thank you for the trouble.

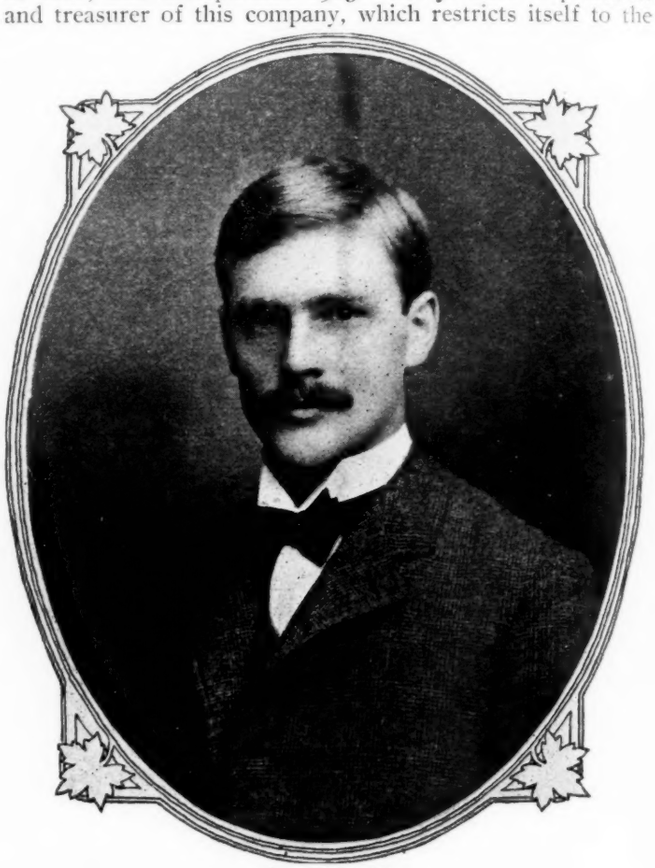
But if, for a moment, one of the young ladies happens to carry on a conversation with her best fellow, some one is sure to find it out, and a report to the manager of the telephone company follows, with possibly a suggestion that the young lady isn't doing her duty and should be replaced by one more worthy of the position.

Worthy, indeed! The telephone girl works long hours, tries to please everybody and receives a small wage and the harsh words of customers for her trouble.

The telephone line between Rome and Paris is to be opened very shortly, at all events in time for Victor Emanuel's visit to France.

WELL KNOWN HEADS OF WELL KNOWN HOUSES

We refer to the telephone as a simple mechanical device, without considering that each minute part that helps to make the whole has furnished its share of trouble in the finished product. The transmitter arm was particularly neglected in the beginning, and it is claimed that the subject of this brief sketch was first to create the "concealed cord arm," now generally adopted by Independent manufacturers. This improvement was immediately patented and its good qualities eventually led to the organization of The W. J. Barr Manufacturing Company, Cleveland, Ohio, established in 1886, and incorporated 1903. W. J. Barr is president and treasurer of this company, which restricts itself to the



W. J. BARR.

manufacture of telephone transmitter arms and enjoys a large and continually increasing trade. The company controls many forms of frictional spring joint concealed cord arms, known as "Barr's patents." Mr. Barr is earnest in his efforts to supply the needs of the trade and assumes a quiet and determined aspect in regard to his company's welfare. He is one of the younger men who has confined his purpose to a single accomplishment, rendering a marked degree of success in his chosen field, producing a most satisfactory and reliable device that is finding a ready sale and is rapidly becoming known as the standard of excellence in quality and design. Commendable references have been made in this department, eulogizing men that occupy influencial and prominent positions; but it is safe to assume that exacting details have not been more carefully and conscientiously explored in any business, by any individual, than is given to the business of the W. J. Barr Manufacturing Company by its president.

The Issue Between The Automatic and the Manual.

To the editor of TELEPHONY:

In the April, May, June, July and September numbers of your journal, Mr. J. J. Nate has been giving most valuable papers about the Independent telephone systems. There is not an instance cited by him which does not conclusively show:

First, that competition against the Bell is thoroughly conclusive and valuable; and,

Second, that the trouble of increasing rates in increasing plants is due to the necessity of "scrapping" the present plant that it may be replaced by a larger plant. This is due almost wholly to the bewildering "multiple" system of the manual exchange.

That Toledo, Detroit, Grand Rapids, Ottumwa, Rochester and many other places have "scrapped" their plants (some of them again and again), and yet compete with the Bell, shows clearly that the Bell must have stock water soaked plants.

The Bell and its creatures have not been able to construct or to get others to construct any successful automatic exchange.

The Bell would not buy the "Strowger" when it could have bought it. If, in 1896, the Bell had bought the "Strowger" and had replaced the Bell plant at Fall River with the "Strowger" automatic and then had only the present success of the "Strowger" at Fall River, it would have had to reconstruct its entire system—"scrap" every local plant, squeeze out the water in the stock, and lower its rates everywhere.

The Bell did not, at any time, wish to disturb the then present condition, for it did not desire the attention of the people directed to the wrongful issues of its stocks.

The Independent manufacturer of switchboards simply followed the Bell line of work. Of course, the Bell and its parasites threatened and attacked the Independent manual switchboard fellows, claiming a monopoly under the Carty patents for multiple exchange.

While this fight was going on, the bright fellows in the Independent ranks were competing fairly for business, and, until the Carty cases were decided, did not find it proper to get out their special improvements.

When the Carty cases were decided, and the court, with stinging words, exposed the meanness of the Bell and its tools, and cleared the way for real competition, then the Independents jumped forth and (admitting that multiple systems are to be used) worked to such purpose that the Bell is nowhere in the race. (The proof of this lies in the history of the manner by which the Bell lately acquired the Kellogg company.)

Every Independent telephone has been, and now is, a nail in the coffin which is being built for that indescribable monopoly—the Bell Telephone Company.

Every such telephone has been made possible by the Independent manufacturer of multiple switchboards. The people supported the Independent manufacturer against the Bell, and now some of them join with the Bell to prevent further progress for the people.

Wherever there is a single telephone, or thousands of telephones, there is complete evidence of the value of competition. It is so silly to say otherwise.

Please allow me to put in here the table marked "Evidence from Iowa Independents."

EVIDENCE FROM IOWA TELEPHONE, INDEPENDENTS.

Begun	Pop.	Place	Cap'n	Per Phone	Dividend	Sub'rs		Bell Sub'rs.	Bell Rates		Former Bell Rates	Remarks
1899	700	Ireton	$10,000	66	mutl	47	5-5					
1899	3,500	Cresco	40,000	109	12	370	12-9					Bell has toll line—no exchange.
1899	1,200	New London	10,500	44	6	240	12-12					
1900	600	Conrad	1,500	16		96	12-12					
1896	5,000	Decorah	100,000		20	495	14-9	30	12	9	36-24	System.
1899	1,500	Northwood	10,000	66	10	150	15-10	1				
1894	300	Pleasanton	2,000	33	40	60	15-12					5 toll lines.
1901	1,400	Hawkeye	35,000	50	10	700	15-12	200	15	9	36-24	System 150 m. in 3 counties, &
1896	2,000	Seymour	19,000	78	20	245	18-10					
1897	5,000	Fairfield	15,000	28	15	550	18-12	15			36-30	Bell rates "anything or free."
1885	1,900	Sigourney				185	18-12					$6,000 yearly profits in increase.
1894	5,000	Washington	30,000	79	(15)	380	18-12					
1897	1,300	Woodbine				200	18-12					200 on county lines, $12.
1900	1,100	Lisbon	16,000	49	10	128	18-12					
1899	2,500	Ida Grove	25,000	60	20	425	18-12	2		24	30	
1898	3,500	Albia	8,200	40	15	375	18-12	1				
1902		Hancock	10,000	50	m.	65	18-12					
1898	2,000	Audubon				140	21-15					
1897	20,000	Ottumwa	80,000			1050	24-12	200				Rebuilding.
1900	1,500	Mt. Vernon	10,000	50		200	24-12	1				Bell toll.
1900	3,600	Eagle Grove	80,000	80	10	375	24-12	8	12	6	24-12	Common stock pays 13%.
1900	2,727	Hampton				325						
1900	2,840	Iowa Falls				300						
1900	2,513	Tipton	10,000	35	good	292	24-12	15	18	6	36-18	
1894	2,000	Rock Rapids	3,000	18		165	24-15					Private party owns plant.
1898	2,500	Rossville	20,000	29		700	24-18					5 towns.
1899	1,500	Rockwell City	*50,000	62	8	180	24-12					*800 in county.
1899	2,800	Nevada	30,000	100	10	302	24-15				30-18	Bell toll.
1893	6,000	Webster City	25,000	63	10	400	30-15					
1895	15,000	Waterloo	150,000		10	800	30-18	400	30-18	9	50-36	Cedar Valley Tele. Co.
1900	9,000	Iowa City	50,000	62	8	819	30-18	27	21	9	48-24	Bell had only 147 phones in 1900.
	10,000	Oskaloosa	60,000	55	good	1100	30-18	250	24	3-12	48-36	Branch of InterState of Aurora, Ill.
....	13,000	Marshalltown	30,000	37		825	30-18	650				

All (but one) of these instances, as you know, were in answer to circulars which I had sent out over my signature, or that of my Canadian friends and attorneys, Messrs. Nesbitt, Gauld & Dickson of Hamilton, Ontario. This table is decisive on the question of competition. In the face of these mute but eloquent facts, the man who denies the value of competition, anyhow and anywhere, in the telephone field, is either careless, or foolish, or worse.

Mr. Nate has tenderly but thoroughly skinned the "Mayors," who, shining by the reflected light of the Bell, or with minds in a mushy state, declare against competition and for a monopoly (*for the Bell*) in the telephone business. If there is a spirit of genius in the common law, it is that of hatred for a monopoly of any kind. But evidence of the existence of competition is not confined to the declarations of the common law.

From the moment that the infant draws its first breath, until, with or without loving hands, its body is laid in the ground, there is for it, and ever will be, continuous struggle against the awful resistances to life. Even where nature gives to man her natural foods, there is a labor for man in the gathering of and the learning to preserve them, so that, over against the little present time, he may still have something of them for his food. And then again some other one may contest for the plucking of the food and gathering of the fruits. And when his fellow man did not oppose him in his desire to garner and preserve food, the wild beast oftentimes destroyed him while both were competing for the gathering of even a few berries.

When society was formed upon the theory of a combination of individuals for mutual protection, still he had to break the ground; sow the seed; and, out of storm and sunshine, and heat and cold, count his little chance of even gathering a grown crop. Then came the unceasing toil and thinking about preparing his grains, saving his fruits, and weaving his fibres—that a better use of the product might be had, if not by himself, then by his children.

The drayman competes; the merchant competes; the lawyer competes; the preacher competes; the doctor competes.

Everywhere there is unceasing, almost wolfish, competition; *all because man does not know how to use the material God has given him.* And, above all, the farmer competes; not only with his fellow men, but ceaselessly all the while against the elements, against the hate of "experts" (who remain experts only so long as they cannot convey their facts to the brain of their fellow men); against the concessions that the coward in the community is willing to make against them in favor of the monopolist—that thief of the opportunities of men, women, and children in a community.

And yet these "Mayors," these mushy men, talk about the need of allowing the Bell company to maintain a monopoly of the telephone business.

COMPANIES.	PHONES.	AVERAGE RATES.	BELL'S AVERAGE FORMER RATES.
INDEPENDENTS.	12,674	20-13	
BELL.	1,800	13- 8	34-25

An examination of the above table of Iowa business shows that the Independents, in competition with the Bell, since 1896, have in the towns named swept the Bell out.

The Independent plants are increasing, while the Bell is being reduced to toll stations.

The Independents have a mileage in Iowa of 15,428 miles.

The Bell has mileage of only 6,271 miles.

These figures are correct. The man who talks of monopoly for the Bell in Iowa, after having a chance to know them, is a poltroon.

But the table shows something else than successful competition. If one examines the items of *capitalization,* and *capitalization per telephone, and the dividend,* it is clearly seen that the great variance must be the result of the defects of the manual switchboard. Probably a better instance could not be given than that of Ottumwa. Dr. Herr and his friends bore the brunt of a manly fight, on their part (against the Bell's unmanly fight), to serve the people —and yet, after succeeding in almost annihilating the Bell, had to improve their plant and increase rates.

Dr. Herr states in a paper which he sent to me in August, 1902, that "we are putting in a plant to accommodate 1,500 —equipped with central energy—conduit construction 24,-000 feet. All will bring value of plant to $120,000, losing about $30,000, in former construction, being replaced with new."

Here we have a clear view of the cost of increasing plants while using the manual exchange. *The remedy is with the automatic.*

In the account which I have given, the items of cable, conduit and construction of whatever kind, are referred to the figures tendered by standard makers of these materials.

I had sent out from my office in Toronto, and from my attorney's office in Hamilton, and from my New York office, inquiries to prominent makers of cable and conduit in the world. Selecting from the many, I quote authority on cable account:

Office of Oscar Wentworth Rogers, 32 Stuyvesant Street, New York, Oct. 6, 1902.

Mr. Charles J. Marsh, Gen. Mgr. Standard Underground Cable Company, 56 Liberty street, New York.

My Dear Sir: Some time since I had sent out inquiries regarding the cost of dry core telephone cable, consisting of twisted pairs of No. 19 B. & S. copper wire, paper insulated and sheathed with one-eighth lead. These inquiries were from my office in Toronto, the Modern Telephone System for Canada, and I am making the fight in Hamilton. We are getting replies to the enclosed circulars from Independent telephone companies.

Those thus far received betray the fact that there is no construction system, and that there is a hole somewhere in the business. I do not believe it is with the cable manufacturers or with the conduit makers; but do believe it is with the constructors and manual people, who are continually changing or improving their systems. As we propose to make an effort to amalgamate the Independent companies in the Western states and change to the automatic, I have determined to build nothing but conduit systems and am therefore making both issues at Hamilton. If the variation in the business (as shown by the following references) is due to the grasping of constructors and to the license of the manual crowd, then we do not wish to start with the idea that the cost of cable and conduit is the reason why cheap rates cannot be given.

PLACE	No. of Subscribers	RATES Business	RATES Residence	Per ct. dividend	Capitalization per phone	REMARKS
Johnstown, Pa....	1,600	30	24	6	$125	This condition must be caused by 1—Watered capital or 2—Gouging construction or 3—Manual changes and cost, or by a combination of these evils. I believe that the manual people are the offenders. The accounts for large exchanges show this conclusively.
Chambersburg, Pa	1,192	24	18	6	83	
Lewisburg, Ohio..	410	24-	18	6	25	
Ashtabula, Ohio..	1,020	24-	18	6	74	
Zanesville, Ohio..	400	36-	18	8	182	
Connersville, Ind	480	24-	16	8	82	
Fayette, Ind.....	1,700	30-	18	8	70	
Erie, Pa	1,300	40-	28	8	75	
Adrian, Mich.....	850	24-	18	8	47	
Salem, Ind.....	1,000	12-	9	5 to 15	30	
Fairfield, Iowa....	550	18-	12	15	28	
Albia, Iowa.....	371	18-	12	15	40	
Sidney, Ohio.....	704	24-	15	15	61	
Burr Oak, Mich ..	340	12-	12	20	47	
Dixon, Ill..... ..	1000	24-	18	20	30	
Caro, Mich.....	1,000	20-	12	30	72	

We refer to your firm for price of cable. The division as to miles and pairs are from a survey of Hamilton for 3,000 telephones, average length of lines, one-half mile.

The mayor and a majority of the finance committee say they have inquired and the account is not right in any particular and propose giving the Bell a franchise.

Please look over the account and, admitting that the change in price of copper must alter price, give me a quotation for each item, both for your place and f. o. b. at Hamilton. (You see these men think we can get goods in a minute, etc.)

1. Are the prices (in the circular) for cable right?

2. Could you deliver cable, eleven station, twenty-three mile pole line, twelve metallic circuits, varying lengths, soon?

3. Can you probably deliver me large amounts of cable commencing January 1?

4. Are you willing to manufacture cables for me of special design (and of the small wire I told you of when last I saw you)?

Please answer these questions fully enough so that it will avail to get some real facts into the heads of my official friends at Hamilton. They think I must show them that I am backed by National banks before they are safe in admitting that I can get goods at these prices. The Bell's genius, its manager, tells them these prices are wrong and that ends it with some of the council. Sincerely,

OSCAR WENTWORTH ROGERS.

New York, Oct. 20th, 1902.

Oscar Wentworth Rogers, Esq., 32 Stuyvesant Street, City.

Dear Sir: Referring now to your esteemed favor of the 6th inst., asking for prices on certain material and requesting answers to certain questions, we take pleasure in replying as follows:

1st. The prices as stated in your circular on the various sizes of telephone cable would apply now, and are therefore amply high for estimating purposes.

2nd. In relation to the twenty-three miles of twelve pair cable we would be able to promise delivery on that material in from thirty to sixty days after receipt of detailed lengths.

3rd. We could supply you with very large quantities of cable beginning with January first; in fact, to the amount of 100,000 feet of 100 pair cable or equivalent per month, and could begin shipment on such cable thirty to sixty days after receipt of detailed lengths.

4th. In answer to this inquiry we would say that we would be willing to undertake the manufacture of any special style of cable which you might demand, but of course you will understand that the prices for standard material as given you are no criterion for figures which we would perhaps be obliged to charge on such very special cable.

We give you below, as requested, our present prices on the cables as indicated, one set of figures being f. o. b. factory, and the other being the price of the cable delivered in Hamilton, Ontario, but in each case without duty to be paid by us. The cable we are quoting on is our high grade material, double-wrap paper insulation, each conductor No. 19 B. & S. G., and covered with one-eighth inch lead sheath, viz.:

	F. O. B. Factory.	Delivered at Hamilton
25 pair No. 19 B. & S. G double wrapped paper, ⅛-in. lead	19.½c	20.4c
30 " " " " " " " " "	21.½c	22.½c
50 " " " " " " " " "	28.3c	29.55c
100 " " " " " " " " "	43.7c	45.55c
150 " " " " " " " " "	61.3c	63.6c
200 " " " " " " " " "	77.4c	80.2c
250 " " " " " " " " "	93.4c	96.6c

You will, of course, understand that these prices are for the material in car lots, and while they include freight allowance to Hamilton, in the column under that heading, yet they must be understood as being exclusive of duty, etc. If these prices were for material for domestic use, they would have to be very considerably increased in view of the fact that the foregoing figures were prepared based on using imported lead. We believe that we have answered fully the questions which you have put before us,

and trust same will answer your purpose. In reply to the postscript in your letter, the writer would indeed be very glad to witness the experiments which you mentioned in our conversation, and we trust that we will have an opportunity to do this at a very early date.

Awaiting your further favors, we beg to remain, very respectfully,

STANDARD UNDERGROUND CABLE COMPANY,
Per CHAS. J. MARSH,
General Manager Eastern and Northeastern Sales Departments.

The figures quoted in my account, which you published, for steel armored cables are deduced from letters from the Electrical Company, Limited, of London.

ON CONDUIT ACCOUNT.

32 Stuyvesant Street, New York, October 6, 1902.

Mr. B. S. Barnard, vice president and secretary Standard Vitrified Conduit Company, 39 Courtlandt Street, City.

Dear Sir: Some time ago we obtained from various sources information as to the price of vitrified clay single duct conduit, and in a summary of the replies we quote, in an account which I am using at Hamilton, a price of four cents. As I know of a change in the relation of companies that make conduits, and for various reasons the prices of such conduits have been effected and I think mainly by a combination of companies practically forming a trust, but, at any rate, I am sure that there must be an increase in price, will you not please quote to me a price which you think fair for 125,400 feet of vitrified clay single conduit delivered f. o. b. Hamilton; and, to be safe, will you not also quote price at your factory, as it is possible that the delivery of goods may not at once be made. Will you not kindly specify in your information when you will be able to start on the order?

Thanking you in advance for attention and kindness, I am, very respectfully,

OSCAR WENTWORTH ROGERS.

STANDARD VITRIFIED CONDUIT CO.

New York, Oct. 6, 1902.

Mr. Oscar Wentworth Rogers, 32 Stuyvesant Street, City.

Dear Sir: Replying to yours of even date, your statement as to the conditions of the conduit market and the changes that have taken place from time to time in the past six months, is quite correct. Due to this fact, the price of conduit has somewhat advanced, also due to the fact that the demand for conduit is far greater that the production.

We quote you on single or multiple duct conduit, as you may prefer, four and one-half cents per duct foot, f. o. b. cars our factory, South River, N. J., or we can quote you approximately five and three-fourths cents per duct foot f. o. b. boat Toronto or Hamilton, if water delivery can be secured. This does not include tariff or duties. We will be in a position to make ordinary deliveries this year and in very large quantities any time after January 1, 1903. The above quotation is understood to be in lots of over 100,000 duct feet. Very respectfully,

STANDARD VITRIFIDD CONDUIT COMPANY,
B. S. BARNARD, *Vice President and Secretary.*

So it is seen that my account for Hamilton was and is conservative. Cable cost was high; conduit cost was high; cost of laying cable ample; cost of laying conduit ample.

THE AUTOMATIC ALONE IS LEFT FOR DISCUSSION.

The figures for 3,000 subscribers' telephones at $10 per telephone, and the automatic switch at $5 per telephone, were given to me as the price that would probably be charged for the Lorimer automatic. This information was furnished by one of the owners and promoters of the Lorimer.

I understand that the Lorimer people have now concluded to charge considerably more than these prices.

In November last, I submitted to the mayor and finance committee of the city council of Hamilton, the letters of Messrs. Marsh and Barnard, and also a letter from Dr. J. W. Chisholm, as follows:

The Faller Mechanical Operator, office 22 Union Square, East, New York, Nov. 12, 1902.

Oscar W. Rogers, Esq., New York City.

Dear Sir: I have seen your itemized account for cost of installation of telephone plant in Hamilton, and so far as the cost of automatic exchange apparatus is concerned, it is absolutely correct. We expect to be able to deliver apparatus within a few months, and the first deliveries may cost from fifteen to twenty dollars per subscriber.

The following statement as to the Automatic Operator has been accepted as true in every particular by the best experts in the United States, both of the Bell and Independent companies:

This is the only Automatic "Operator" in existence, and the only Automatic Telephone System which dispenses entirely with human operators and at the same time reduces enormously wires and connections in the exchange, as compared with even the most modern and approved manual multiple systems in use, thus ensuring such large and important savings in all the heaviest items of expense, as will give its users practical control of the telephone business.

Yours truly, J. W. CHISHOLM, *President,*
The Faller Automatic Telephone Exchange.

In the account published in the September TELEPHONY, the automatic was given at the Lorimer figures. The figures should have been $20 per subscriber instead of $15.

You will notice in the column marked No. 2, we have not subtracted from the total of conduit construction, the $18,000 we save in conduit construction by use of the steel armored cable. Therefore, if you add the $15,000, the difference between the $15 per subscriber and that of $20 per subscriber, then subtract the $18,000. We have $174,998 as a total instead of $177,998. But to be doubly safe, I have revised the account according to the construction for Des Moines. (See estimate for telephone plants in Iowa. Total, $182,476.)

Any one can get the "Faller" Automatic Operator at $20 per telephone. These people have standardized the automatic operator.

So it is seen that at every point evidence is given as to the verity of this account.

In a circular which I issued from my office in Toronto (and which was sent to many Independent companies, with a request to furnish me information as to their plants), I gave a list of the "Strowger" automatic exchanges already equipped, and said:

"That the 'Strowger' people deserved great credit for their years of struggle against the Bell crowd and the Independent manual exchange people. The 'Strowger' has supplanted the 'Kellogg' at Columbus, Ohio.

"It looks very much as though the manual people were going to join hands with the Bell to fight the automatic systems, but the Fall River, Columbus and Dayton plants of the 'Strowger' is putting the manual out of the race." (It is quite significant that since that time the Bell company has eaten and digested the Kellogg company. The inside history of that deal will probably furnish, in the near future, some evidence of the refined style of the Bell's work.)

In that same circular I said, "The 'Faller' will soon be on the market, and I regard it as the best automatic for large exchanges. Its improvements are startling."

So, commencing with March, 1902, I declared for this account and absolutely for the automatic and for the "Faller" operator. Now, we will see what the attitude of the "expert" has been with regard to the automatic.

A Mr. Dommerque, who is a Kellogg employee and "expert" (being of a judicial mind and entirely unprejudiced), yet could not believe in such a change, nor could his conscience permit him to commend my absolute selection of the automatic, and so it was decided by his employers and probably by the Bell crowd (also disinterested), that an attack all along the line should be made on the automatic. Mr. Dommerque was detailed to advise the public (through the Telephone Magazine, a most worthy and conscientious and impersonal publication, controlled by persons who are interested in the manufacture of manual switchboards, as I understand), that my figures, about the Hamilton proposition, were entirely wrong; and that the whole automatic proposition was wrong and absurd, and could not amount to anything; for, had not the Bell "Good Samaritans" long been traveling up and down looking for an "automatic" with which to bind up the wounds of the people? And never found it! Therefore, Mr. Dommerque thinks it is nothing short of wickedness for any one to even think of opening the subject again. And then he proceeds to use half of his space to entirely misstate the automatic situation.

He says: "It is true that the Bell has better automatic

systems to-day (May, 1902) than that owned by the other companies, but after extensive experiments and a great deal of deliberation on the subject, *by some of the best telephone experts in the world,* it was decided that it would be impossible to manufacture and maintain automatic exchanges and give proper service."

Mr. Dommerque is either ignorant or vicious.

The best automatic the Bell has is that of Bullard and McRorty—the patents for which were issued September 23, 1902, but were filed for action in the patent office November 16, 1900, and August 29, 1901. Mr. Dommerque is on such good terms with the "Bell's best telephone experts of the world" that it is fair to presume that he knew of these at the time he wrote his weird article.

Of course, Mr. Dommerque, having asserted that the decision by the Bell and all the best "experts" having been that these patents (and all others) were useless, *cannot now assert them against any inventions that are proving successful or against those that may prove successful.*

We have Mr. Dommerque's word for it that the Bell is out of the race for automatics. If the Bell is not out of the race, then Mr. Dommerque is shown to be ignorant, and his claim of knowing or of being among the "best telephone experts" of the world is a pretense, and that smacks of being vicious. *There are no telephone experts;* and if there were any such they would not be found in the employ of the Bell company. Just look at the decisions in the Berliner and Carty cases and see to what a depth of degradation the Bell company has been brought by its "experts"!

But Mr. Dommerque is an "expert" on his own account. He says: "Another fundamental objection to an automatic system is that local battery is used for transmission instead of central energy." Even if all automatic systems used local batteries, his claim for manual systems is not good. The "Strowger," at Fall River, had proved for months that no manual could compete with it. The Bell at Fall River is being skinned about as fast as its "experts" were skinned in the Berliner and Carty cases.

Mr. Dommerque is ignorant if he did not know this. If he did know these facts, then he was vicious to write as he did. The man who knowingly tries to stop the progress of the race, and prevent better methods of transmission of intelligence, is little less than a criminal.

But if this were all, I should not have spent any time over this Mr. Dommerque.

He must have been ignorant if he did not then know of the "Faller," an automatic operator (not exchange), and therefore using central energy. The patents had been granted and a model had been exhibited for months before Mr. Dommerque had written his article. If he did then know of the "Faller" then he was deliberately vicious to write as he did. No one, having ordinary knowledge of mechanics, could have read the Faller patents without being startled by the plan of that operator, and being compelled to involuntarily exclaim, "Why has no one ever thought of this before?" And then I cannot imagine such an one not going immediately to the model, and, upon observing the simple and sure way by which it worked, how it would be possible for any one not to be glad and happy in the fact of the potential benefits for mankind that must follow the use of this machine.

At any rate, Mr. Dommerque has now seen the "Faller" work, and it is now due to the public, from him and from the Telephone Magazine that they shall correct their public attitude regarding the relative values of the best manual and the best automatic, up to date. (I have taken the time with Mr. Dommerque because he is the "expert" who was so fully quoted by the Bell creatures in Hamilton against our proposition. His views as to construction are no more sound than his views are about the automatic."

It is an easy matter to judge Mr. Dommerque's attitude, but when it comes to the attitude of Kempster B. Miller, the renowned and able expert, not only of the Kellogg company, but in the general field of telephony, I am almost at a loss to know what to say. Mr. Miller has written upon all telephone subjects in a fair and judicial manner, and seems to have desired, in all his work, to adopt an attitude which sound judgment and exact knowledge would sustain.

That his services were of the greatest avail to the Kellogg company up to the point where the Bell company thought it of value enough to absorb, should not, I think, be charged against Mr. Miller; but from this time on no man, however great or wise, should be allowed to stand in the road of progress towards the standardization of the telephone business.

In the September TELEPHONY, Mr. Miller, in a paper entitled "Trend in Development of Substation Apparatus," says:

"It seems now that the telephone engineer and the operator of exchanges have arrived at a parting of the ways. So far in the development of telephony the tendencies toward the reduction of labor on the part of the subscriber, simplification of the subscriber's apparatus, and the concentration of all its sources of energy at the central office has been marked and those deviations from this well-defined direction of progress have resulted in short-lived movements of little moment.

"We are now asked to face the proposition, strongly advanced, to require the subscriber to do all the work in making his connections, to put back the local battery at his sub-station, and to add to his telephone, not the old magneto generator, but a selective switch containing in itself more complicated mechanism and more movable contacts than many complete telephone instruments of modern times. We are asked that the subscriber shall be required, not to turn the old generator crank and ask for his number as in the magneto system, but to transmit by a manual device one number at a time, to spell out, as it were, all the digits forming the number of the connection which he desires, and then press the button to send the ringing signal. In a word, we are asked to put aside all of the advantages of the common battery with its greater economy from almost every conceivable standpoint to require the subscriber to do all the work of making connections, and to begin over again the developments of a new art along lines which seem to point backward instead of forward. The questions before us to-day are, First: Will the public stand for it? Second: Can the telephone companies afford it?"

When it is known that Mr. Miller has seen the "Faller" automatic operator, *which is nothing but a mechanical operator and is a central energy system,* one will hardly know how to account for his belief that there is no central energy system.

I insist upon it that if the "Strowger" automatic were the only one in existence, not being a central energy operator, that the manual would have to steadily, surely and finally give way to it; but with the Faller in the field it is absolutely incomprehensible to me how so able and fair a man as Kempster B. Miller could have made any such statements as the above at this stage of development.

It is a pleasure to turn from "experts," who know nothing, to men who, like Mr. Faller and his business associates, are doing something for themselves and their fellow men that is historical.

All the "Bellmen" and "telephone experts" in this world cannot stop this "Faller" operator. What is it?

Oh! it is just a well-made machine *that will pick out for you any one of* 10,000 *telephones, or* 100,000 *telephones, when you line up the number of the telephone you wish on the face of your own instrument! That is all!*

Incidentally it occupies only twenty-nine per cent of the space of a manual exchange.

It detects and announces any break in any line.

No other line is affected by the break in the one.

It saves the expense of human operators—their salaries and housings and attendance.

It keeps your confidences and your conversations from spies and sneaks.

It enables you to add any number of telephones to a plant without materially increasing the cost per telephone.

It will sell at no greater cost than that of a small manual exchange—i. e., per subscriber.

The cost for maintenance and operation and depreciation will be absurdly little.

It will do its work when locked up and left alone during the days and nights and Sundays.

It will make a basis for complete association of the honest Independent companies.

It will "trunk" to any long distance terminal as if that terminal were next door.

The Bell, the common foe of all, cannot beat it; and no monopoly has money enough to pay for its value—for it will cut the average rate per telephone finally to $10 or less, *and which poor little monopoly can pay for the control of the speech of the world?*

What does this all mean? Just this: A plant of any number of telephones (not less than for 100 telephones) can be started and when more than a hundred is needed, another division for 100 telephones is put into the central, and so on up to, say, 100,000. And the telephone put into the subscriber's house, in the beginning, will be complete for calling up to the 100,000!

The additions are made at the central, and once your telephone is in, it is never touched for any purpose of increasing the plant.

And this is not all there is about the "Faller" people. They know that many companies could not afford, at this time, to throw away their manual plants. So, with something of the same thoroughness and ability that characterized their automatic work, they proceeded to plan and make a semi-automatic—*without multiples*—the result being that, taking large plants fitted with the manual apparatus so that one operator can do about five times the work of the operator on the manual system.

For the benefit of small-minded and narrow persons, who cannot conceive of any one doing anything from the standpoint of principle, I state that I have no interest, expressed or implied, in this Faller system—excepting only that interest of a citizen who desires to see the standardization of the telephone.

ATTITUDE OF THE INDEPENDENT MANUAL MANUFACTURER.

Facing the "Faller" automatic and the "Faller" semi-automatic, it seems to me as if the Independent manufacturers of manual exchanges, will make a very serious and final mistake if they do not consider that, with their systems, there is no possible chance of standardizing the telephone business.

They are simply manufacturers; and with the almost unlimited demand for telephones in this country, and particularly in rural communities and agricultural districts, it will be impossible for them to furnish even a very small percentage of the goods that are being and will be demanded.

They have served a great purpose when fighting the Bell. Why should they fight a possible chance to be part of the great and general development, which is at hand. At any rate, they cannot stop this automatic. We will soon know what the attitude of these men is. Events are crowding fast towards the point where the farmer and the small towns and cities will not ask what they think of it.

I will save my own inventions to make sure that the complete standardization of the telephone business shall not be delayed.

OSCAR WENTWORTH ROGERS.

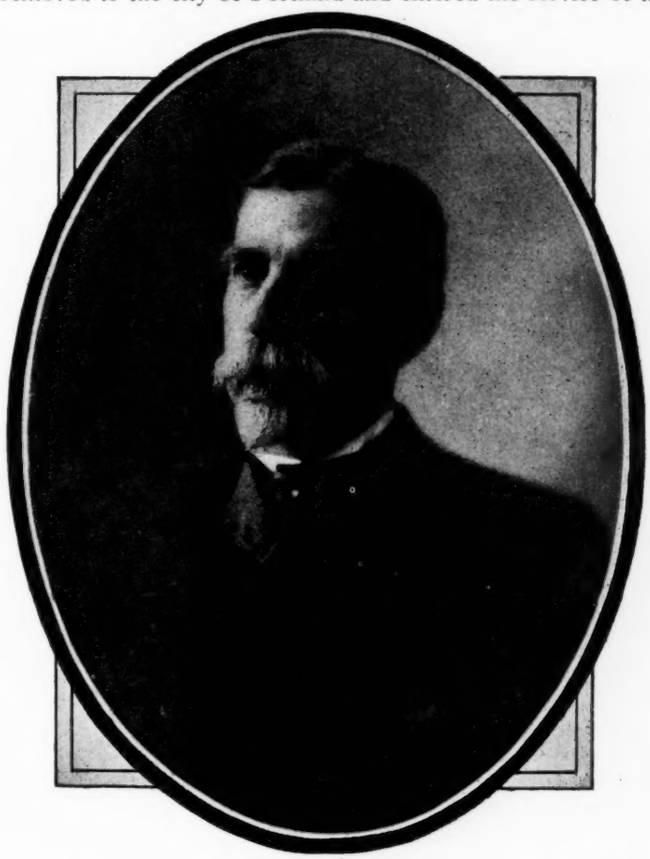
Chicago, September 23, 1903.

William Jennings Bryan talked to several thousand farmers scattered over Dewitt County, Illinois, at the annual fair recently held at Clinton, Illinois. By a unique connection through means of a megaphone attached to a telephone, and which was connected with the rural exchange in Clinton, Mr. Bryan not only addressed 6,000 persons at the grounds, but all those who desired to take advantage of the opportunity at the telephone.

PROMINENT EXCHANGE MANAGER.

Lewis A. Goudy, vice president and general manager of the Northeastern Telephone Company, Portland, Maine, has been prominent in Independent telephone circles for the past five years, on account of the terrific fight he has made against the Bell company in its stronghold, the New England states.

Mr. Goudy was born in Boothbay, Maine, June 10, 1849, and later resided in the city of Bath, in the graded schools of which city he received his limited education, afterwards graduating in the school of experience. When a boy he entered the employ of the Maine Central Railroad, serving three years as an employe of that corporation. In 1869 he removed to the city of Portland and entered the service of a



LEWIS A. GOUDY.

wholesale grain and feed merchant. He remained with this firm until 1881, in which year he engaged in the confectionery business under the firm name of L. A. Goudy and Company, later known as Goudy & Kent, who became the largest manufacturers in their line north and east of Boston. He retired from this business in 1898 to engage in the telephone business, in which business he has remained. Mr. Goudy secured control and was elected to the presidency and general management of the Dirigo Telephone Company of Maine, the name of which corporation was later changed to Northeastern Telephone Company, and which is now pushing installation of the Strouger automatic exchange system in Portland and other cities in Maine, connecting with the company's rural line and village community service, which extends throughout western Maine, the company's charter being the broadest and most liberal ever granted by the state, which is supplemented by another equally broad and liberal for New Hampshire, under the title of the Granite State Telephone Company. The Northeastern's lines will soon be extended into New Hampshire. Mr. Goudy believes in "Government of the people for the people and by the people."

PRACTICAL TELEPHONY

CONDUCTED BY P. KERR HIGGINS, A.M.I.E.E.

ARTICLE XI.

Central energy or common battery systems may be divided into two main divisions: (1) Those having battery furnished to the cords through impedance coils; (2) those having battery furnished to the cords through repeating coils. The first may be considered as the adopted system of the Independents, the second that of the Bell licensees. Several pieces of apparatus are common to all and a consideration of their use is very necessary to understand any circuit.

The Retardation Coil.—Impedance or retardation coils are made up of heavy copper wire and of low ohmic resistance; this wire is wound around a core of soft iron wires to increase the magnetic inductive effect. These coils, because of their peculiar construction, will not allow currents of a varying or alternating character to pass, but present a good path for a steady, direct current. In other words, the high frequency currents of the talking circuit cannot pass these coils, preferring a non-inductive circuit. By using these coils any variation in the resistance of the line circuit will affect the amount of current passing on that particular line only, and the variations will not pass through the coils to another line working on the same battery, provided always the internal resistance of the battery is low, such as in the accumulator. The flow of current under these conditions will be in proportion to the resistance of the circuit, and more cords can be added to the original circuit by the introduction of a retardation coil in each cord circuit.

Repeating Coils.—These are a form of induction coil, the difference being that both coils (primarily and secondary) are of the same ohmic resistance and are wound in the same direction, the same number of turns also being used. In these (unlike the retardation coils) the currents are separate, except inductively through the windings. The primary is known as the coil connected in the circuit of the talking or sending subscriber, and the secondary as the listening or receiving circuit. It is obvious from this that they are constantly changing, hence the necessity for both coils being alike in every way. They are usually made in four windings of silk-covered wire and brought out to binding posts. These windings are over a core of annealed iron wire, the whole inclosed in a soft iron shell.

Relays.—These are used in every system and may be single or double. They are generally classed as (1) the line relay, this being the one used in the line circuit for operating the line lamp; (2) the cut-off relay, used for putting out the line lamp when a call has been answered; sometimes these two are combined under one cover; (3) the cord circuit relays, which operate the supervisory signals; (4) special relays, used for night alarm pilot, lamps test, etc. The principles of these are nearly all alike, the only difference being the arrangement, number of contacts, the specific resistance and form of mechanism. They have for their basic operation the use of the electro-magnetic principle. The act of passing a current through a coil of wire wound on a rod of soft iron (or wires of same material) energizes the iron and makes it for the time being a magnet; in front of this at one end is a disk, which, by being drawn to and from this magnetic core, opens or closes a contact or contacts, as per a pre-determined arrangement (see Fig. 1). Such a combination, constructed much on the same principle as a tubular drop, which has its coil completely inclosed in an iron case, constitutes the modern and much-used relay. It is necessary to cover the whole in an iron case, thus closing the magnetic circuit, to dissipate any stray induced currents which might pass to other adjacent coils were such a provision not made. These relays are adjusted to operate at seven hundred fifty

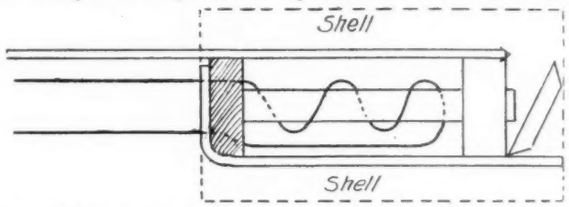


FIG. 1.—SHOWING SKETCH OF RELAY WITH CONTACT CLOSED WHEN RELAY IS ENERGIZED.

ohms and fall away at ten thousand ohms, this being the maximum line leakage allowed.

Induction Coils.—These are standard, the only variation being as to their resistance, compared with those used in local battery work. They are used almost entirely in the instrument at the sub-station. It is customary to connect the receiver in the secondary, but their use is very limited and

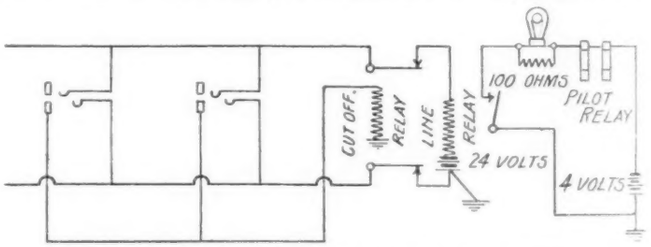


FIG. 2.—SHOWING FOUR VOLT LINE CIRCUIT.

the retardation coil is supplanting them, giving as good results with a much simpler circuit.

Several systems are in use. The Stone system has absolutely no coils whatever at the sub-station and battery is fed direct. In the Dean system the induction coil is used at the sub-station, and this system, with some modifications, is standard with the Western Electric Company and has been

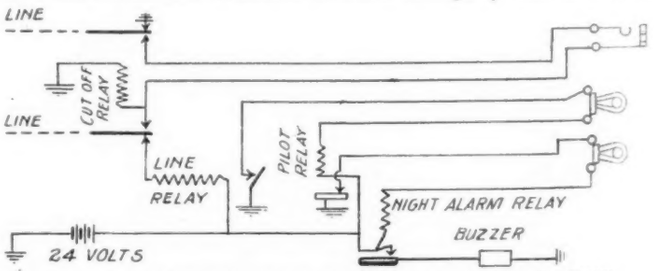
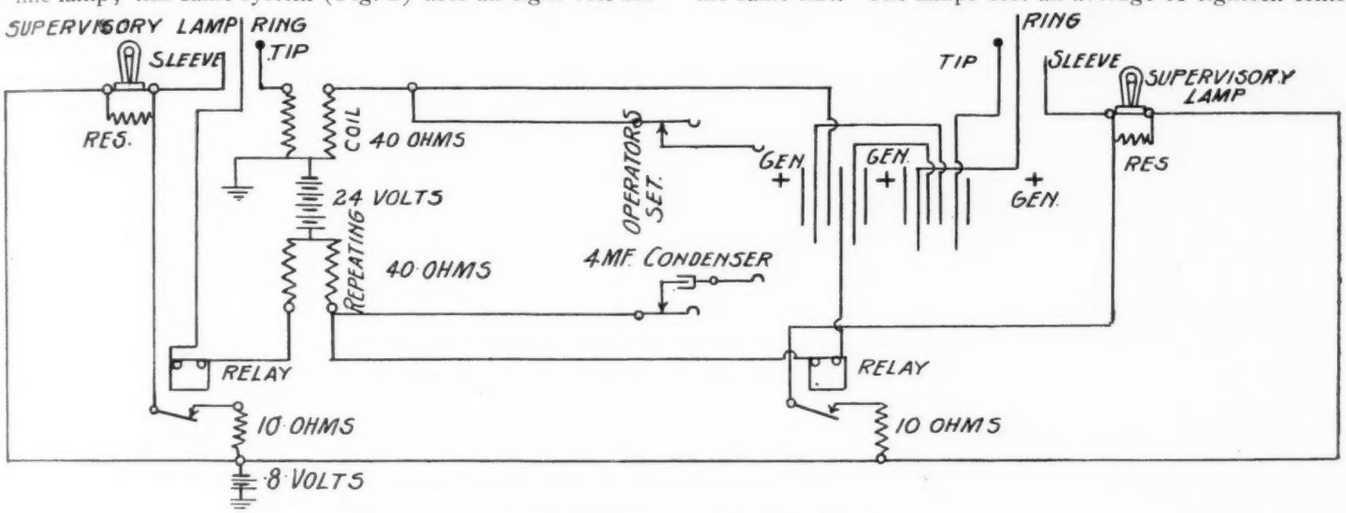


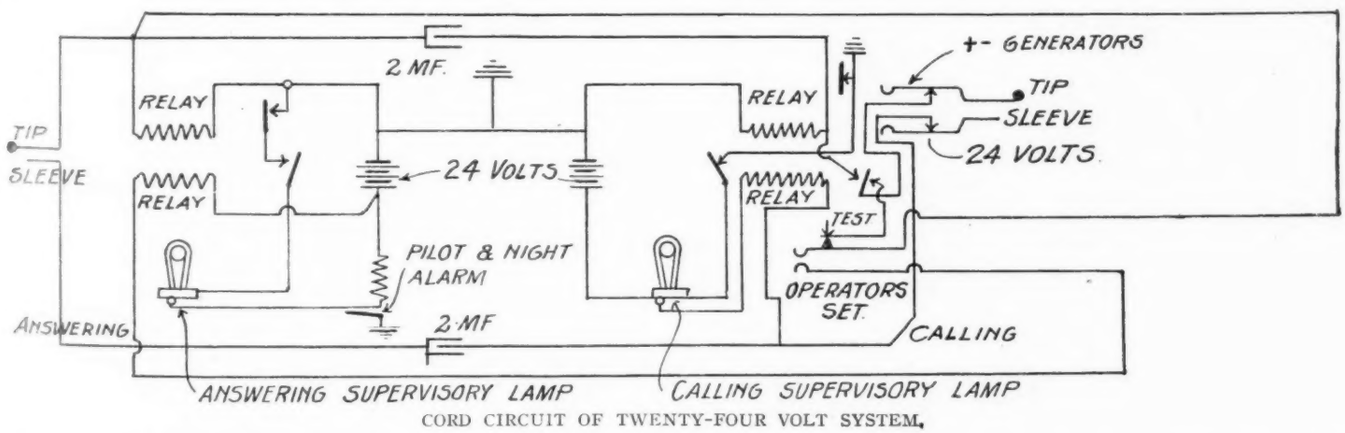
FIG. 3.—SHOWING TWENTY-FOUR VOLT LINE CIRCUIT.

installed in a large number of exchanges. The Kellogg system makes a very effective and simple circuit by using the retardation coil only at the sub-station and relays as retardation at the central office. It is undesirable to have too many relays in any system, but there are places where they are really beneficial and necessary; one is liable, however, be-

cause of their facility for permitting all kinds of combinations to be made, to overdo their use to the detriment of the system and consequently the service. Several methods are in common use for accomplishing the same end—e. g., one system has a twenty-four-volt current supplied to the line, the act of taking down a subscriber's receiver closes the circuit, allowing current to pass through the relay, which, being energized, draws up a disk, closing a local circuit in which a four-volt current is connected in series with the line lamp; this same system (Fig. 2) uses an eight-volt battery to operate the cut-off relay and a two-volt cell for the transmitters in central office. This means complication, and it is now general practice to use the twenty-four-volt battery for all purposes. The whole battery is connected to a bus-bar, thence through a shunt (Fig. 3) to the different fuse strips, and in this manner the circuits are simplified and are less liable to break down. In using the four-volt lamps a resistance of one hundred ohms is usually bridged across each lamp for protection, but does not interfere with its efficiency. This resistance is also often used (being in the pilot circuit), so that even when the lamp is burned out and does not show light, the pilot lamp burns, and the fact that no line lamp is burning at the same time indicates to the operator a burned-out line lamp, and the operator immediately cuts in on the "common" and gets the subscriber's number and the number desired. The connection is then made and the burned-out lamp reported to the proper party. The shunt is usually made of German silver wire and inserted in the lamp socket. The supervisory and line pilot lamps in such a system are generally operated by the eighty-two-volt battery. The operator cuts into the battery feed or "common" either by a plug inserted in a specially connected jack or a listening key or button cut in the circuit and also having her telephone connected to same key or button. All new systems now being installed are equipped with one battery of eleven cells with twenty-two volts. By using one battery a great saving is effected. A test made on both systems showed lamps burned out or destroyed on the mixed voltage system one hundred and seventy for one month, against twelve lamps burned out during a month's use on the one voltage system. This was in an exchange of approximately the same size. The lamps cost an average of eighteen cents each and a saving of this kind would mean on a fair-sized exchange nearly a thousand dollars, enough to pay the salary of a good man. The one set of batteries also renders the damage to lamps less, as the increase of voltage on charge is divided up in such a manner as not to make its presence felt at any one point. The supervisory lamps have a much shorter life than the line lamps, being used oftener, and are subject to jars from the cord plugs being dropped on the shelf; hence the necessity for operators being warned to be careful to return all plugs to their proper place and not pull them out of the jack and let the weight do the rest. To overcome the patent covering the use of one battery the Independent manufacturers have arranged a system of dividing the battery into two distinct (yet common) sets of eleven cells each, and so arranged as to divide up the exchange load, one set taking care of the answering cords and one the calling cords, all other desks and taps being equally divided between the two batteries. This makes a very flexible system and gives good results.



CORD CIRCUIT OF FOUR VOLT SYSTEM.



CORD CIRCUIT OF TWENTY-FOUR VOLT SYSTEM.

Storage Battery.—Nothing is so essential to a central energy system as a good storage battery, having sufficient capacity as not to be overloaded. It is customary to allow

about fifteen ampere hours' capacity per one hundred lines. This is sufficient to prevent any overloading, which is highly injurious to the elements of the battery and greatly reduces their length of life. About fifteen per cent more discharge should be allowed than is expected. The working surface of the standard G type cell used in nearly all large exchanges is fifteen and one-half by fifteen and one-half inches, nine plates of which give a capacity of 600 ampere hours. The following table shows the several styles of battery, charge and discharge, and data as to dimensions:

Chloride Accumulators.

Type.	Size of plates, inches.	No. of plates.	Weight of each element, lbs.	Discharge in amperes. 8 hrs.	5 hrs.	3 hrs.	Norm. charg. rate.
B	3x3	3	3	5/8	7/8	1¼	5/8
C	4x4	3	5	1¼	1¾	2½	1¼
C	4x4	5	8	2½	3½	5	2½
C	4x4	7	11	3¾	5¼	7½	3¾
D	6x6	3	8	2½	3½	5	2½
D	6x6	5	14	5	7	10	5
D	6x6	7	20	7½	10½	15	7½
D	6x6	9	26	10	14	20	10
E	7¾x7¾	5	23	10	14	20	10
E	7¾x7¾	7	33	15	21	30	15
E	7¾x7¾	9	43	20	28	40	20
F	10½x10½	9	86	40	56	80	40
F	10½x10½	11	106	50	70	100	50
G	15½x15½	9	180	80	120	160	80
G	15½x15½	11	219	100	140	200	100
G	15½x15½	13	260	120	168	240	120
G	15½x15½	15	300	140	196	280	140
G	15½x15½	17	341	160	224	320	160
G	15½x15½	19	382	180	252	360	180
G	15½x15½	21	422	200	280	400	200
G	15½x15½	23	463	220	308	440	220

It will be noticed that the normal charging rate is the same in all cases as the discharge rate for eight hours.

Several types of accumulators are in use, but the lead sulphate type is almost universally used. In this type the positive electrode consists of lead peroxide and the negative element of spongy lead. One more negative element is always allowed per cell than positive. The energy efficiency is given as seventy-five per cent and the ampere hour efficiency as ninety per cent, yet the actual efficiency per pound of the active material is only fifteen per cent, the bulk of the energy being consumed in forming sulphate. The internal resistance per cell is very low and varies according to the condition of the cell at time of test, being greater when carrying a small load than otherwise; it also varies with the density of the solution as electrolyte, being at its lowest when the specific gravity is 1,225. All charging must be carefully done and should be regular at a uniform rate; this rate is usually quoted by the manufacturer and any departure from this is generally disastrous. Experimenting with storage cells in actual use or necessary to be used on short notice should not be done for the reason that it is easier to destroy a cell than build it up, and quicker to dissipate a charge than renew it. Cells should never be discharged below 1.9 volts. If for any reason it is desired to put a cell out of commission it should be fully charged, then given a recharge, once a week take off electrolyte and place in clear, pure water and discharge at normal rate, then decrease resistance to almost nothing, leave in water thirty-six hours; then it may be put away. If, on the other hand, it is desired to place it in service soon again, it is best to fully charge it and leave it in its regular solution at 1,200 specific gravity. The charging rate is usually eight amperes per square foot of the area of the positive plate. The length of charge varies and the only safe method is to keep charging until the density of the cell fails to rise and the voltage is 2.5 per cell. The color of the plates of a cell in good order is chocolate brown for the positive element and steel gray or slate for the negative. Two faults are common to all storage cells—namely, buckling and sulphating. Both are generally due to ignorance, accident or carelessness. Sulphating is often due to charging at too low a rate and may be dissolved by the judicious increase of the charging rate. The former is a different proposition and the plates, if not too far gone, may be taken out and straightened. If the buckling has only begun they may be gently pressed back to their normal position by strips of hard rubber or wood pressed between the plates and held there for a few days, watching the cell before, during and after the charge. The positive plate is the most susceptible to injury and is the first to break down. The cells should be carefully examined from time to time with an electric lamp (properly inclosed in a glass tube) so as to detect the accumulation of sediment particles of wire and the loose active material which from time to time may fall from the plates. This is necessary to prevent short circuiting, partial or complete, of the elements by becoming wedged between them. Also see that all plates are clear of contact with each other and the lead tanks. It is well to cover the cells with glass to keep out impurities of all kinds, and only distilled water should be used in making or adding to the electrolyte. It may here be remarked that it is seldom necessary to add more acid; water only should be added in case of evaporation. The glass will reduce the evaporation to a great extent, as it mostly takes place during the boiling stage, and when the glass is provided the water condenses on the glass, forms bubbles and falls back into the cell, thus saving about forty per cent of the water. The polarity of the charging leads, if not known, may be found by inserting the two bare ends into water or sulphuric solution and bringing them near to each other, when bubbles will form on the negative pole. In connecting up connect poles of same denomination together; for example, the + of the lead to the + plate and the — to the — plate. Records should be carefully kept every day, showing rate of charging, rate of discharge, voltage and density before and after charge, also duration of charge. The electrolyte is usually made up of five parts of water to one of sulphuric acid, and when made up should have a density of 1,200. The rise of the density over 1,210 generally indicates the necessity for more distilled water. All connections should be soldered and leads run from each cell to a switch connected with a voltmeter for convenience in taking readings. The room in which the battery is located must be well ventilated and shaded from any bright light, kept clean and have a cement or asphalt floor, with all woodwork painted with asphaltum paint. There should be no exposed metal trimmings other than the lead of the edge of the tank, the element heads and terminals, otherwise the fumes from the cell are liable to oxidize them.

Power Board.—Every facility should be afforded for testing gas to voltage and amperage, and the volt and ammeters should be so arranged as to be able to apply them to any machine or cell at will. The starting boxes and field rheostats should be mounted on the back of the power board, the whole back of which should be easily accessible. The rheostats are controlled from the front by means of small hand wheels, with indicator so marked as to show when the resistance is cut in and cut out. All machines should be in duplicate, both for ringing and charging; in the case of ringing one machine works on the electric power supply, the other on the battery, and this latter is only used in an emergency. The supply usually is either 110 or 220 volts, and the ringing side seventy-five volts. The emergency machine is twenty-four volts on the power side and seventy-five volts on the ringing side and runs from 750 to 1,000 cycles per minute. These machines are usually arranged to supply an alternating and a pulsating current, both negative and positive, as may be desired. This latter is used for signaling on party lines. The whole power board is mounted on a marble slab with switches for cutting the machine in and out of service, fuse strips with individual fuses for protecting each and every circuit, overload and underload circuit breakers. These latter are operated on the electro-magnetic principle; the current passing through a coil energizes the magnets and holds or lets go the automatic cut-out at a pre-

determined amperage. All fuses must be replaced, on becoming burned out, by ones of similar denomination. All machines must be kept free from dust, clean and well lubricated, no sparking at the brushes being allowed, as this very quickly cuts up the commutator. Once in a while, as may be necessary, the commutator should be smoothed down with fine sandpaper; grease and emery cloth should be avoided. A little paraffin wax rubbed on the commutator or a little "Gale's compound" will keep it in good running order. The charging machines should be in duplicate and so arranged as to permit charging while the battery is in use, without creating any noise on the talking circuits. Attachments, such as a "Howler" (used to call people who leave their telephone off the hook), if used at all, should be used with extreme caution, otherwise injury to the hearing of some one may result.

A BIG IOWA COMPANY.

In reply to a number of inquiries as to the aims and objects of the recently formed Union Telephone and Telegraph Company of Keokuk, Iowa, with a capital stock of $1,500,000, we append the incorporation notice from the secretary of state's office, which gives the desired information:

Notice is hereby given that we, the undersigned, for ourselves and for such other persons as may become our associates, have associated ourselves together and agreed to become a body corporate, for the purpose of pecuniary profit, under and by virtue of the laws of the State of Iowa, and for the purpose have adopted, agreed to, signed, and acknowledged articles of incorporation, which have been duly filed of record and which provide as follows:

1. That the name of the corporation is: Union Telephone and Telegraph Company, and its principal place of business is at Keokuk, Lee County, Iowa.

2. The general nature of the business to be transacted is to acquire, lease, own and operate telephone and telegraph lines and stations in the State of Iowa, in the State of Illinois and in the State of Missouri, and in other States and Territories of the United States, to lease, construct, acquire, own, maintain and operate in the several places aforesaid, any other system or systems of transmitting sound, signals or intelligence by electricity or otherwise; to buy and sell at wholesale or retail, or both, telephone and telegraph wire, poles and appliances, and to manufacture or buy and sell at wholesale and retail, or both, telephone or telegraph instruments, supplies and apparatus; to manufacture and sell or lease telephone and telegraph apparatus and devices and supplies; to use, own, buy, sell or lease patents and shop rights for telephone and telegraph apparatus and devices; to buy, own, lease and sell any real estate, franchise or personal property or any interest therein that the corporation may deem necessary to use in its business; to buy, own, lease or sell any or all kinds of personal property, including shares of stock in its own organization and in other corporations, and in respect of such shares of stock, to have and exercise all the rights and privileges which a natural person might have or exercise; to issue bonds, debentures, notes or other evidences of indebtedness and to secure the same by mortgage or deed of trust or collatral pledge, and the special object or business of this corporation shall be to take, hold, purchase, own and operate all of the patents, property and franchise of the Mississippi Valley Telephone Company of Iowa, and of divers other telephone companies and of divers persons and firms owning telephone properties now operating in the States of Iowa, Missouri and Illinois.

3. The authorized amount of the capital stock of this corporation is one million five hundred thousand dollars ($1,500,000), which is to be divided into one hundred and fifty thousand (150,000) shares of the face or par value of ten dollars ($10.00) each. One-half of the capital stock of this corporation, comprising seventy-five thousand (75,000) shares of the aggregate value of seven hundred fifty thousand dollars ($750,000) will be common stock, and the remaining seventy-five thousand (75,000) shares will be preferred stock. Preferred stock will receive a cumulative dividend of seven per centum per annum before any dividend is paid upon the common stock; after the payment of the seven per cent dividend upon the preferred stock, all dividends thereafter paid during the year will be distributed ratably to the common stock. In case of the winding up or dissolution of the corporation the property and assets thereof, after the payment of its just debts, will be applied, first, to the payment of the respective holders of the preferred capital stock of the par value of their respective holdings, together with all accumulated, unpaid dividends, if any, thereon, and second, to the holders of the common stock pro rata in proportion to their respective holdings.

Capital stock of this corporation, either common or preferred, or both, and its mortgage bonds in such amounts as the board of directors may determine may be issued and disposed of at par in payment for, and upon the sale and transfer to this corporation of, the stock and bonds or the rights, privileges, properties and franchises, or both, of the Mississippi Valley Telephone Company of Iowa.

The residue of said stock may from time to time be issued at part or face value for such sums as the board of directors shall authorize in payment for the rights, privileges, franchises and properties of other telephone companies of the State of Iowa, or of other States or Territories, or in payment of the purchase price of patent and shop or operating rights; or said stock may be sold at not less than its par value and the proceeds thereof employed in and about the proper corporate purposes of this company, as the board of directors shall by resolution determine.

4. This corporation will commence as soon as its certificate is issued by the Secretary of the State of Iowa, and will continue for the full period of twenty years thereafter with the right to renew its corporate existence from time to time, as three-fourths of the vote of the stock outstanding at any annual meeting of said corporation may determine.

5. The business of said corporation will be conducted by a board of five directors, who shall be elected each year at the annual meeting. All directors must be stockholders and must be elected by the stockholders at the annual election to be held each year on the second Monday in September, and shall hold their offices until their successors shall be elected and shall qualify.

The board of directors shall elect from their number a president and a vice president, and from their number or otherwise, a secretary and treasurer of this corporation, and shall have authority to appoint and employ all necessary persons to carry on the business of this corporation.

6. The highest amount of indebtedness to which this corporation shall at any time subject itself, shall not exceed in amount two-thirds of its paid-up capital stock.

7. The private property of the members and stockholders of this corporation shall be exempt from liability for the corporate debts.

J. C. Hubinger, Edward W. Hurst, G. H. Johnson, Charles Messer, P. C. Burns, Alfred Stromberg, Charles W. Farr, E. B. Overshiner, Henry Shafer.

A MILLION DOLLAR COMPANY.

Articles of incorporation for the United States Telephone and Telegraph Company were filed recently with the county recorder at Waterloo, Iowa. The company is incorporated for $1,000,000.

The incorporators are T. K. Elliott, James Gardiner and C. E. Pickett. The officers of the company are T. K. Elliott, president; James Gardiner, vice-president and L. H. Bowhan, secretary.

The object of the company is the development of the telephone interests in Iowa, and it will probably reorganize the telephone property now known as the Cedar Valley lines.

The people identified with the movement are well known business men of Waterloo and include the above named persons, together with Mr. J. F. Hemenway of the Ericcson Telephone Company of New York, whose attorney, Mr. Eliot Norton, has spent some time in looking over the legal aspect of the matter during the past few months, and Mr. Wm. Baird, a prominent attorney of Omaha, and others.

The work outlined by the new company includes the completion of the system now operated by the Bickley and Bennett interests and the expenditure of large sums of money for new and improved service.

The officers do not go into details as to their plans, but it is evident the transaction is among the most important that has taken place in telephone circles in the state, and possibly in the West.

The telephone has made the word "hello" a universal greeting in every place on the globe where language is spoken by wire. All languages, English, German, French, Spanish and the thousand and one others, are transmitted faithfully by the telephone, so that the interpretation of the telephone might be said to be universal. No matter, however, what the nationality of the speaker may be or what vernacular he may employ, every telephone message in all languages is preceded by the great American "hello."

Municipal Telephones in Great Britain.

F. DAGGER

Municipal telephony in Great Britain is at present in its infancy, no system having been long enough in operation as a completed plant to show the actual profits earned in one year.

Glasgow. The best example on record is that of Glasgow, where an analysis of the accounts for nine months ending May 31st last shows that 4,718 direct exchange lines yielding an average rental of $10.22 for the nine months, enabled the department to meet all legitimate charges and carry forward a profit of $1,940. Had all these lines been earning revenue during the whole period which the accounts cover, at the municipality's annual charge of $25.60, the profits would have been very much higher, but this rate was not fixed with a view of producing profit, over and above the payment of interest and redemption of loan.

Before the establishment of the Glasgow municipal exchange, the rates were $48.70 in the city and $97.40 to $121.75 in the suburbs. The telephone area of the municipal system is 143 square miles and the rate is $25.60. The system now numbers over 9,000 subscribers or more than the monopoly obtained in twenty-one years, and at a recent meeting of the city council it was decided by forty-eight votes to nine to borrow an additional $400,000 to enlarge the plant to a capacity of 15,000 lines.

Many misleading statements upon this subject, copied from the English papers, have appeared in the press on this side of the Atlantic. It is needless to say that these articles were the work of inspired writers, written for the purpose of discouraging the municipal ownership of public utilities. The following letter from A. R. Bennett, M. I. E. E., furnishes an indication of the inaccuracy of these published criticisms:

"Sir: The references to the Glasgow corporation telephone system in your article on 'Municipal Socialism,' of Sept. 30, have been read with astonishment in this city. It is a pity that your contributor did not consult the accounts themselves instead of the garbled versions of them which have been published and circulated throughout the country for the purpose of deterring other municipalities from imitating the latest successful venture of the Glasgow corporation.

"It is not my wish to engage in any controversy, but in the interest of accuracy, and lest those not in a position to judge should be egregiously misled, it is necessary to state that your contributor's conclusions have little or no foundation in fact. The auditors of the Glasgow Corporation Telephone Department, Messrs. Thompson, Jackson, Gourlay and Taylor, one of our leading firms of chartered accountants, whose reputation is not confined to Glasgow, have found it expedient to write to the local press, pointing out that the accounts did not justify the interpretation sought to be put upon them by the writers to whom your correspondent has gone for inspiration.

"For instance, his insinuation that the year 1901-02 was credited with the whole of the £28,171 received during the nine months ending May 31st is wholly untrue. Credit was taken for only £15,356, the proper portion; £12,417 was carried forward to the credit of 1902-03, and £398 remained as a surplus. Your contributor adopts the absurd and dishonest canard about the central switchboard, and is equally at sea in respect to the sinking fund, and most of the other topics touched upon. He actually commiserates the corporation upon their license expiring in 1913, in ignorance of the fact that it was at the express desire of the corporation that that date was fixed.

"Municipal trading may or may not be wrong and mischievous, but misrepresentation of facts is not very likely to prove a very effectual or very permanent cure for it. I venture to assert that the organized attack to which municipal telephony is being subjected —an attack which must already have cost its authors a good many thousands of pounds—is the clearest proof of its success, and should be accepted as the highest possible compliment by its supporters.

"In the meantime certain small crumbs of comfort remain to us. We have three times as many telephones in Glasgow as when the corporation exchange was started; we have a good service instead of an atrociously bad one; any person can have a telephone for £5 5s, instead of the £10 (£20 and £25 in the suburbs) which was formerly charged; we are coining money for our citizens in more ways than one, for time is money, and a good telephone is time; and we, in conjunction with the other corporations who have taken up telephony, by placing nearly all our work with British firms, are doing much to create what has never before existed—a home trade in the manufacture of telephone material. I am, sir, yours, etc., "A. R. Bennett, *General Manager.*"
Castle Chambers, Glasgow, Oct. 12.

Sir Samuel Chrisholm, the ex-lord provost of Glasgow, referring to these articles, says:

"I quite agree with your correspondent that it would be well for other towns to look closely into the figures contained in the Glasgow corporation telephone accounts, as if properly studied and understood those figures could not but assist the extension of municipal telephones."

The following statistics are taken from the official report and accounts as on May 31st, 1902, issued by the Glasgow Corporation Telephone Department:

Population	847,000
Telephone area (square miles)	143
Switchrooms	9
Completed lines	5,479
Junction lines	306
Partially completed lines	8,787
Pairs of wires in cables	14,572
Miles of trenching	94
Miles of single pipe or duct	104½
Capacity of ducts in pairs of cable wire, including 12,428 spare	27,000
Miles of cable	113½
Miles of pairs of wire in cables	11,061
Expended on underground plant to date	555,773
Cost per mile, per pair of cable wires	$50.25
Expended on plant to date	$938,418
Number of employes	628

The statement of revenue and expenditure for the year ending May 31st, 1903, shows the following result of the year's working:

Total revenue		$271,395
Working expenses		77,759
Net revenue		$193,636
Less interest on loan	$32,346	
Sinking fund	28,276	
Post office royalties	16,582	
Terminal fees	7,292	
		84,496
		$109,140
Add surplus from 1902		1,938
		$111,078
Deduct proportion of rentals applicable to 1903-4		100,877
Surplus carried to reserve fund		$10,201

The capital expenditure for the year was $382,568.

Tunbridge Wells. Municipal telephones have been in operation in this town for about the same period as the Glasgow system. The following are the facts regarding this exchange:

The municipal telephone area covered 250 square miles, the average charge to subscribers being $22.27 per annum. The number of subscribers grew so rapidly that on January 1st, 1902, their number had reached 650 and the municipality made application to the local government board for permission to increase its borrowing powers from $48,700 to $121,750. The fact that this permission was granted, after an exhaustive enquiry by the government inspector, notwithstanding the evidence of expert witnesses and the

arguments of eminent legal counsel employed by the National Telephone Company and the Ratepayers' League, is sufficient proof of the financial success of the system. The report of the Tunbridge Wells Borough Accountant of February 10th, 1902, which was produced at the enquiry and certified by the Local Government Board Auditor, showed an excess of income over expenditure (including interest and redemption of loan) of $3,190.

The competition had the effect of bringing down the National Company's rates from $48.70 per annum to $19.44 for direct lines, and $1.25 and sixty cents per month for two party and ten party lines respectively.

The National Telephone Company has recently succeeded in making a deal with the town council by which the municipal system is transferred to the company upon its agreeing:

1. To pay the municipality the amount expended upon the plant to date.
2. To assume all liabilities in respect to the system.
3. To give service to all subscribers at a rate not exceeding $29.22 per annum for the term of twenty-five years.

As the municipal license was granted for a period of twenty-five years and as the "National" license expires in 1911, the company hoped that this arrangement would enable them to operate for the municipal term, viz., until the expiration of the twenty-five years' license. The postmaster general, however, refused to sanction the transfer except upon the following conditions:

1. That the company observed all the conditions of the municipal license.
2. That the municipal license cease and determine on the same date as the "National" license in 1911.

The victory is therefore an empty one for the "National," as although it has disposed of a competitor, it has also been compelled to reduce rates permanently, and forfeit privileges which the license conferred upon it.

The fact that one year's opposition in Tunbridge Wells has resulted in telephone users obtaining a permanent reduction in their telephone charges from $48.70 to $29.22 is a striking proof of the value of competition.

Portsmouth. A municipal telephone service was recently established in this town at the following rates: For unlimited service, $28.61 per annum; message rate, $17.05 and one cent per outgoing call, or $12.18 and two cents per outgoing call. There are now 1,250 subscribers, and the original estimate of $124,185, having already been expended on construction, the town council has decided to borrow an additional $58,440 to increase the capacity of the exchange to 2,000 lines. The profit for the month of July was $390 after all expenses had been met, and with an increasing revenue, better results are confidently anticipated. All wires are underground in the town. The rate charged by the National Telephone Company before the establishment of the municipal exchange was $48.70 per annum.

Brighton. The municipality of Brighton is constructing a telephone system for 2,000 subscribers at an estimated cost of $210,341, all work being underground. The rates are: For direct lines, $24.75; two-party lines, $20.45; four-party lines, $14.61 per annum. The working expenses are estimated at $49,908 per annum.

A municipal exchange is in course of construction at Swansea; while the Port of Hull will commence building a system as soon as the consent of the local government board to the borrowing of the necessary capital is received. The rates in both these towns are similar to those in operation at Portsmouth.

The following are the particulars of the licenses already granted by the postmaster general for municipal telephone systems in Great Britain and Ireland:

Town.	Period of License.
Glasgow	March 6, 1900, to Dec. 31, 1913
Belfast	Feb. 28, 1901, to Dec. 31, 1911
Brighton	April 30, 1901, to April 30, 1926
Chard	Dec. 13, 1901, to June 24, 1922
Grantham	Sept. 18, 1900, to Dec. 31, 1911
Huddersfield	Feb. 22, 1901, to Feb. 30,1926
Portsmouth	Sept. 21, 1901, to June 30, 1926
Hull	Aug. 8, 1902, to Dec. 31, 1911
Swansea	Sept. 27, 1902, to Dec. 31, 1920
West Hartlepool	Sept. 30, 1902, to Sept. 30, 1927
Oldham	Dec. 31, 1902, to Dec. 31, 1920
Scarborough	Dec. 31, 1902, to Dec. 31, 1911

The State of Guernsey (Channel Islands), which, although part of the British Isles, has its own internal government, owns and controls the telephone service. With a population of 35,000, mostly farmers and fishermen, the island is covered with telephone lines, there being over 1,000 subscribers. The total receipts in 1901 from all sources averaged $14.52 per subscriber, and after setting aside ten per cent for depreciation and sinking fund, a profit of $573 was shown. The rates in Guernsey are: 3,200 calls per annum, $24.35; or on the message rate system, $10.96 per annum and one cent a call or $7.31 per annum and two cents a call. The last named rate is the most popular, as out of a total of 770 subscribers in 1901, 678 had adopted this scale of charges.

December 31, last, the number of subscribers' lines in Guernsey was 1,073, or equivalent to one line for every thirty-seven inhabitants, thereby making it the best telephoned area in Great Britain. The following statistics are taken from the report of the state department for the year ending December 31, 1902:

Expended on construction	$91,796.41
Expended on land and buildings	10,918.28
Cost per line	85.55
Revenue ($15.80 per line)	16,963.78
Working expenses	3,959.13
Office expenses	1,117.15
General expenses, including management, rent, rates, taxes, interest on loan, postoffice royalties, etc	7,321.64
Set aside for depreciation and sinking fund	4,700.60
Net profit	765.21

Subscribers.	Number.	Increase for year.
Rate No. 1. At $7.31 per annum and 2 cents per outgoing call	814	136
Rate No. 2. At $24.35 per annum, allowing 3,200 outgoing calls	52	13
Rate No. 3. At $10.96 per annum and 1 cent per outgoing call	71	18

There is no doubt whatever that the success of this service is entirely due to the popularity of rate No. 1, and it further demonstrates the fact that the successful telephone system of the future will be the one which adopts the only rational method of charging for the use of the telephone—viz., a low annual rental and a small toll charge of one or two cents for each call made.

In addition to the 1,073 working lines there were several hundred partially completed spare lines. The number of subscribers' and public calls was 533,039, or an increase of 153,697 over 1901. The number of telegrams, express and ordinary letters telephoned to and delivered through the Postal Telegraph Department was 4,070, an increase of 1,647.

Canada.—Regarding "municipal telephony" in Canada, it is interesting to note that the Western towns have been the first to seek this means of relieving themselves of the "Bell" monopoly. So far the results have been most encouraging, notwithstanding an unfortunate fire at Fort William, which entirely destroyed the central office equipment. The following extracts from the *Canadian Engineer* and *Renfrew Mercury* fully demonstrate the determination of these municipalities to fight the "Bell" to a finish:

The complete success of the indepeident telephone exchange at Fort William, Ont., the rapidly increasing number of subscribers, and the unqualified support given it by the people in the face of the most adverse and unfavorable outside circumstances, clearly demonstrate the great advantages and benefits of Independent telephony. The plant, which was established by the municipality about a year ago in opposition to the old company, and fully described in our issue of January last, was completely destroyed by

the burning of the town hall, in which was located the central office equipment, on March 10th, as mentioned in a former issue. Immediately after the exchange had been destroyed, and it was known that it would be absolutely impossible to give any service whatever for a time, the old company (Canadian Bell) used every effort possible, first to induce the subscribers of the new system to allow the installing of their service, and when it was seen that the subscribers could not be secured even at this advantage, they endeavored to induce the officials to dispose of the lines, offering to take the property at a good figure and to make practically any concessions asked. Notwithstanding the most attractive offers from the old company, and the fact of not being able to make any connection with railway companies on account of the existing anti-public Bell-Railway compact, it was decided unanimously to re-equip the plant at the earliest date possible. At a meeting of the councillors and committee, the mayor was authorized to proceed with the work. A telegram was at once sent the International Telephone Mfg. Co., Chicago, the manufacturers of the equipment first installed, to duplicate the original order for central office apparatus at the earliest date possible, on account of fire, and a contract was let for a new building, it having been decided to place the central office in a special building for the exchange. The building was constructed absolutely fire-proof. It was finished ready for the central office, the equipment installed and the plant put in complete operation in about sixty days from the time the first plant was put out of service. It is said that the system has been such a marked improvement in service over the old company's plant, and has given such complete satisfaction, that the municipal plant is constantly increasing, while the old company has very few paying subscribers remaining.

The system at Port Arthur, which was established at the same time as that of Fort William, has been equally successful. The following is a statement concerning it:

"Something over a year ago the people became disgusted with the service the Bell Telephone Company was giving and determined to instal a system of their own. The Bell Company exerted their every effort to avert the calamity which threatened to overtake their system here, but without avail, and the result of the struggle for supremacy was a victory for the people and a magnificently modern telephone plant, having an exchange of 250 subscribers and orders for instruments filed which, when all are installed, will give an exchange of 300 subscribers. At the same time the neighboring town of Fort William installed a municipal system and have an exchange practically as large as the local one. The towns joining hands in this venture have a free exchange between them; that is, a subscriber in Port Arthur has, free from further cost than the yearly rate paid this town, the privilege of exchange with subscribers in Fort William, and vice versa. For this splendid service, with over 500 telephones, a uniform rate is charged by each town, namely $24 per year for business phones and $12 per year for domestic phones. The outlook is that a handsome profit will be had, though, as the system has been in use for only a few months, just the amount of profit cannot definitely be stated. The telephone system has cost each town about $12,000 up to the present, but naturally as the lines are extended the total expenditure on capital account will increase in proportion. It is interesting to note that the Bell Company, in the endeavor to break the town's system, offered phones free, with practically no takers, and the sight of a Bell Company phone outside of the railway offices is indeed rare."

The following statistics, which have been recently supplied to me through the courtesy of the respective mayors of these progressive towns, require no comment:

	Fort William.	Port Arthur.
Population	5,000	5,000
Date of installation	Dec. 1, 1902	Nov. 1, 1902
Business rate	$24	$24
Residence rate	12	12
Number of business telephones	90	205
Number of residence telephones	210	100
Total	300	*305
Number of Bell phones before competition	110	136
Number of Bell phones at this date	†	50 to 60
Bell rates before competition—		
Business	$30	$30
Residence	25	25
Amount of investment	$12,300	$12,000

*In addition there are over fifty applications for 'phones unfilled at this date.

†Not very many; can't find out as they do not publish directory now. "Bell" are giving free service in some cases, but can't get subscribers.

To the town of Neepawa, Manitoba, however, is due the credit of having been the first municipality in Canada to establish its own telephone service in competition with the Bell. With what result is amply demonstrated in the following letter from the secretary-treasurer of this enterprising municipality:

Dear Sir—Replying to your letter of the 12th inst., this town started to operate its own telephone system four years ago. We had one hundred subscribers at that date, and our switchboard capacity was 150. We have since had so many additional subscribers that it has now become necessary to put in a larger switchboard, and we meditate putting in a 400 drop board. The cost when first installed was some $8,000, but, as we run it in connection with the electric lighting system, which is also owned by the town, it is difficult to give quite the exact cost of installation and of operation. Our charges are: For domestic purposes, $10 per year; commercial, $20. These rates are sufficient to enable us to give a good all-night service, which has proved entirely satisfactory, and to pay both interest and sinking fund and show a cash surplus. There is no question but what we can operate it both satisfactorily to the subscribers and also profitably to the town. The fact that we have installed one telephone to every eleven of the total population of our town shows that it is well patronized by the ratepayers. The Bell Telephone Company had a plant installed here prior to our own venture, but when we opened up they withdrew entirely, took out their poles, lines, etc. Their rates, I believe, were $25 to $35. They afterwards reduced them to $15 and $25, but they found they could no longer do business here once our system was started. Our system is "metallic circuit," put in by Ness, McLaren & Bate, Montreal. The population of our town at last census was some 1,600. Yours truly, JAS. W. PATTISON, *Secretary-Treasurer.*

Neepawa, Man., Aug. 17, 1903.

The municipalities of Winnipeg, Manitoba, and St. John, New Brunswick, have at present under consideration the desirability of establishing municipal telephone systems.

It is not the purpose of this article to discuss the merits or otherwise of municipal ownership, but the facts stated herein prove beyond dispute that wherever the telephone monopoly exists in undisputed possession of the field the people are dissatisfied and eager to support any system which will release them from the extortionate charges and unsatisfactory methods which prevail in the absence of competition.

CONVENTION OF MUNICIPAL ELECTRICIANS.

The eighth annual convention of the International Association of Municipal Electricians was held at Atlantic City September 2, 3 and 4. The headquarters of the association was at the Hotel Rudolf. The convention was the largest ever held by the association. An interesting program was carried out. The following officers were elected for the ensuing year:

President, A. C. Farrand, Atlantic City, N. J.; first vice-president, J. A. Petty, Rutherford, N. J.; second vice-president, G. F. Macdonald, Ottawa; third vice-president, F. C. Pierson, Morristown, N. J.; fourth vice-president, F. A. Cambridge; secretary, F. P. Foster, Corning, N. Y.; treasurer, A. Busch, Newark, N. J.

Executive committee—J. Murphy, Cleveland; J. B. Yeakle, Baltimore; M. J. Donohue, Niagara Falls; R. C. Mason, Brooklyn; G. A. Holderman, Indianapolis; J. W. Aydon, Wilmington; W. H. Thompson, Richmond; W. Crane, Erie; W. H. Bradt, Troy.

Finance committee—C. E. Deihl, Harrisburg; J. F. McElholm, Lowell; J. Burns, Schenectady; R. P. Gascoyne, Detroit.

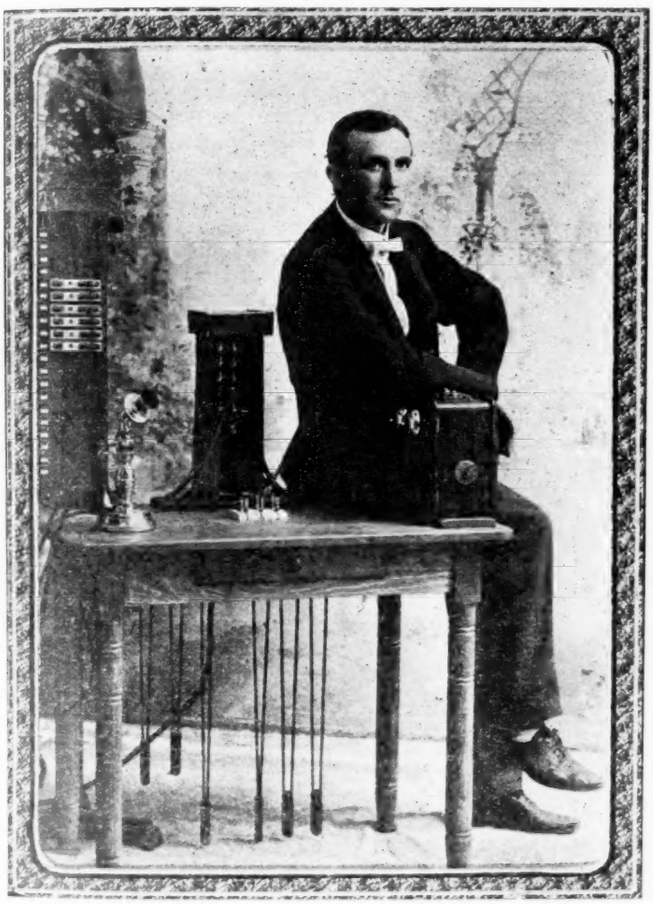
The exact time when the speaking was to commence had been duly announced and the connection with the farm lines was made at that time. The scheme proved very successful and the speaker's voice was distinctly audible over every wire.

All of the meat stores in Nicholasville ordered the Cumberland telephone out of their stores, using only the Home telephone, which has fully twice as many subscribers and gives better service. Some of the subscribers of the Cumberland company stopped using its telephones on this account, and it lost between twenty and thirty subscribers.

A TWENTY-LINE SWITCHING STATION.

In the following illustration is shown a twenty-line farmers' switching station or toll board operated with cords and plugs, but instead of cams a double point double throw knife switch is used, taking the place of three sets of cams, and by which three cord circuits can be operated separately or all at one time. A bridging desk telephone is used for the operator's talking and ringing set.

The cabinet is built for twenty self-restoring drops, fitted



with night bell attachment, distributing rack, lightning arresters etc., making a very complete system, neat in appearance and simple to operate.

The system was designed and built by A. J. Osborn, the engineer of the Missouri Union Telephone Company, Clinton, Mo.

ACTIVITY IN NEW YORK STATE

James B. Ware, 536 Ellicott Square, New York, secretary of the New York State Independent Telephone Association, is compiling telephone statistics for the state of New York. He has mailed to each of the exchanges the circular which is printed below. This work should meet with the hearty co-operation of all Independents in the state, who should not only promptly give the desired information, but become members of the state association as well. The circular, which is accompanied by blank membership application, follows:

Gentlemen: A strong state association, with more complete information and statistics as to the strength and conditions of the Independent telephone movement in all parts of the state, is essential to the general welfare, and valuable to all Independents.

Reliable statistics are desired, as only such have value. While it is a duty each company owes to the common interest to promptly furnish proper information to the association, when requested so to do, in this instance, however, each is urged to co-operate by furnishing the information requested, as a personal favor to those who, without any advantage or gain individually, are endeavoring to collect these facts for the purpose of compiling and publishing them for the use of the members of the association, and others interested in the Independent movement.

Please do not delay filling out the answers to the questions herein asked, in order to look up the *exact* figures, but give those which you know to be approximately correct, and hurry the reports forward to the secretary. If conveniently possible, please forward report within *forty-eight* hours after receiving this circular letter.

If there is objection to answering any question or parts of questions herein asked, omit the same, and send answers to the rest, especially to numbers 1, 2, 8, 10, 12 and 16.

Also, please send a map or rough sketch of all Independent toll lines and connections in your system, territory or county—using either pencil or ink, and any kind of paper.

The essential thing is to forward a sketch or map of the lines in actual operation; those under construction or to be built this fall to be indicated by dotted or broken lines.

It is intended to use this information to get out a state map, showing all Independent lines; and also showing exchanges and stations as far as same can be obtained. Therefore, upon the sketch or map sent to the secretary, please indicate exchanges by and toll stations by

Do not delay sending the map in order to make up a fine sketch, but forward promptly a rough draft or map, unless a better one is already prepared.

Can the association depend upon you in this matter? We thank you for your co-operation.

September 15, 1903.

STATISTICAL REPORT.

1. Name of company.....
2. Main office at.....County.....N. Y.
3. President..... Address.....
4. Secretary..... Address.....
5. Manager..... Address.....
6. If incorporated, when?.....Date service began.....
7. Bonds issued, $.....Stock issued, $.....
   What dividends paid?.....
8. Total telephones in service.....Made by.....
9. Farmers' telephones connected.....Are they included in answer to No. 8?.....
10. Total Bell telephones.....Bell switchboard, central energy or magneto?.....
11. Our switchboard was made by.....
    and is (central energy) (magneto).
12. The following companies connect their lines with us:
    .....

(If operating more than one exchange, please fill out the following, and state whether switchboards are central energy or magneto.)

13. We operate exchanges as follows:
    .....
14. We operate toll stations as follows:
    .....
15. We operate toll lines, and have as follows:
    Miles of poles.....
    Miles of copper wire.....
    Miles of iron wire.....

Above are in metallic circuits, except.....miles of ground lines. (If above information not at hand, make estimate and fill out answers.)

16. What is estimated increase of telephones in your territory up to January 1, 1904?
    .....
17. What is estimate of the increase in miles of pole line up to January 1, 1904?
    .....

Telephone statistics for 1900 have just been printed in the Statistical Yearbook for the German Empire. It is shown that in Germany there were 2,411 cities or towns having public municipal telephone systems, with 305,795 telephones. France had 1,199 public telephone plants, with 72,480 telephones.

The preliminary work for combining many Independent telephone companies in Iowa is nearly complete, by which the control of a large number of companies will pass under the management of one strong company with a capital of $200,000. Southeastern Iowa will be mostly benefited by this combination, but other capital is being solicited, and part secured, to take care of the remainder of the state.

Telephony.

AN ILLUSTRATED MONTHLY TELEPHONE JOURNAL

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In requesting change of address, always give the name of the post office to which your magazine is sent. Your name cannot be found on our books unless this is done.

TELEPHONY is not returnable from the newsdealer. If you desire to purchase the paper from a dealer it will be to your advantage to notify him that you will want it, in order to insure his having a copy for you. If you wish to receive the paper regularly, please send in your subscription so that we can mail it to you direct.

Change in advertisements intended for a particular issue should reach the Chicago office of TELEPHONY by the 20th of the month preceding publication. New advertisements can be received up to the 25th of the month.

ENTERED AT THE CHICAGO POST OFFICE AS SECOND CLASS MAIL MATTER

CHICAGO, OCTOBER, 1903.

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THE OCTOBER TELEPHONY.

We ask every reader of TELEPHONY to especially examine this issue. Read it from cover to cover, carefully. If there ever has been a doubt in your mind as to TELEPHONY being the greatest Independent telephone paper in the world, this issue will remove it. There is no second in the race. TELEPHONY is alone. It is the recognized national authority on Independent telephony.

BELL LOSING GROUND.

In the city of Chicago the Bell company has had an uninterrupted monopoly for a great many years. Its rates are higher than in any city in the United States, excepting New York. The company has about 93,000 telephones in service and expects to reach the 100,000 mark about January 1. The company's stock is heavily watered, but with the high rentals secured, it has paid large dividends. What competition will do remains to be seen. The ordinance under which the company is working provides that it shall pay the municipality 3 per cent on the gross receipts "from the telephone business done within the city of Chicago." The gross receipts of the company last year from all sources were $4,570,000. Enough remained after operating expenses and fixed charges had been taken care of to pay in dividends $1,075,000.

The 3 per cent paid by the company to the city on last year's business amounted to $84,530. This is 3 per cent on $2,817,000. It follows that $1,753,000 of the company's receipts came from business not "done within the city of Chicago." The amount of outside business is surprisingly large. It is true that the Chicago Telephone Company operates in the counties of Lake, Kane, McHenry, Will, Du Page, Kendall and Grundy, and there must be a great deal of telephoning done between Chicago and places like Joliet, Aurora, Elgin and Waukegan, and also much local telephoning in the cities in question, but if the telephone company had not certified that only 62 per cent of its receipts came from business done exclusively within the city limits nobody would have believed it.

The ordinance under which the Chicago Telephone Company is working will not expire until 1909. For nearly six years the company will hand over to Chicago 3 per cent of 62 per cent of its gross receipts, but will pay nothing to any other municipality out of the remaining 38 per cent. During that period there will be large dividends to stockholders —10 per cent probably.

In 1909 there will be a change. The city will not renew the privileges of the company—if it concludes to renew them—on the basis of 3 per cent compensation. It will demand at least 10 per cent. If it had stood out for that figure in 1889 the company would have yielded to the demand and would have paid the city on last year's business $281,000 instead of $84,500. The company would not have been able to declare a 10 per cent dividend, but it could have paid stockholders 7 1-3 per cent on their shares. That would have been quite enough on stock which is nearly half water. There has been a reduction in Bell dividends all around, and American Telephone and Telegraph Company stock has been on the decline. The fact that New England investors have been compelled to take practically all of this company's $22,000,000 of new stock, after absorbing about $15,000,000 of the stock from New York holders, makes the market for this stock quite limited. The stock is selling at the lowest price in years, declining from 150 to 127. The Philadelphia Bell is reducing its dividend from eight to six per cent. The Nebraska Bell is trying to borrow money. The Central Union (Bell) is on the verge of dissolution and the Michigan Bell is bankrupt. It looks as though the Bell interests were feeling the effect of competition.

IN THE SHADOW.

The sale of a majority of the stock in the Kellogg Switchboard and Supply Company, and the resultant transfer of control to men prominently identified with the interests of the American Bell Telephone Company, has been a subject of increasing interest to Independents during the last few months. The sale was made almost two years before it was publicly announced, and the very fact of the concealment of the transfer gave to the proceedings a sinister meaning. Since learning of the details, Independent opinion has been slow to crystalize, being loath to admit the full bearing of the facts. Independents, too, have felt a personal sympathy for Milo G. Kellogg, who has ineffectually sought to have the actions taken in his name set aside that he might again come into the control of the Kellogg company. Denying their own convictions of failure, not a few Independents have hoped and tried to believe that the suit brought by the minority stockholders in the Kellogg company might prevail, and the control of the company continue in Independent hands.

TELEPHONY does not impute to Mr. Kellogg, nor to the gentlemen who have for years been associated with him in building up the enviable reputation of the Kellogg company, any dishonorable or improper motive in their past or present actions and attitude. The editor of this paper has had the honor of close and intimate acquaintance with many of the ablest men on the Kellogg company staff, and has valued highly, and does to-day, the friendship and good opinion of those men. It is with the greater regret, therefore, that we feel compelled to say in our columns that after careful and mature study of the situation, we can find but one course of action possible, but one attitude which as an Independent journal we can consistently maintain, and that is *of denunciation of the Kellogg company, as a Bell concern, not entitled to the confidence or support of Independents in any Independent enterprise.* We have arrived at this conclusion reluctantly, but without the possibility of a change in our opinions so long as the present conditions in the Kellogg company continue. We feel it our duty to our subscribers to explain our reasons fully, and to express TELEPHONY'S opinion as to what course of treatment should be administered in future by Independents to the Kellogg company.

Our fundamental reason for placing the brand of the Bell on the Kellogg Switchboard and Supply Company is that it is admitted that prominent Bell men own a controlling interest in the stock. The sale was regular in every way and was made at a time when the Kellogg company was seriously embarrassed financially. It is difficult to see what other fate than bankruptcy and total ruin could have befallen the company if the Bell men had not bought the stock and replenished the company's credit and treasury. As a matter of fact it was not a Bell plan to buy the company; it was a last desperate resort of the Kellogg company to prevent a disastrous business failure.

The conditions, briefly stated, were these: Mr. Kellogg was physically incapaciated for the work of managing his business, and after giving to Wallace L. DeWolf a full power of attorney, went to California in the hope of recovering the health he had lost. Mr. De Wolf was left with an empty bank account, enormous liabilities and uncollectable accounts. The embarrassments of the Everitt-Moore syndicate, of which the Kellogg company was among the largest creditors, had tied up indefinitely the only possible source of money with which to pay the Kellogg company debts. Made desperate by the importunities of creditors, and in constant apprehension of a ruinous crash, Mr. De Wolf, acting on the advice of Mr. Kellogg's son, L. D. Kellogg, sought, as a desperate chance, the help of Mr. Barton, president of the Western Electric Company (Bell), an old friend of Milo G. Kellogg.

The assistance, begged of him in behalf of a company which was avowedly antagonistic to the interests he represented, Mr. Barton was reluctant to grant. It would seem almost as if the Bell interests would have been better served if he had refused his aid, and had let the telephone world witness the spectacle of a failure which would have staggered Independent telephony to its foundations. Without his aid the Kellogg company was doomed. It is idle and senseless to claim otherwise. Capital was incredulous concerning Independent success, the largest Independent syndicate was practically a wreck, Mr. Barton was the Kellogg company's only hope. That he did not refuse his aid and permit the failure of the Kellogg company was due simply to the fact that he permitted his feelings for his old friend, Milo G. Kellogg, to outweigh what unquestionably would have been insuperable reasons if any other Independent factory had been concerned.

But Mr. Barton was not acting as a philanthropist alone; he was acting as a business man. He looked over the property offered for sale, and convinced himself that it was valuable. He did not try to take advantage of the urgent necessities of the Kellogg company in order to buy stock at an unreasonably low figure, but paid a fair price for what he bought. Mr. Barton was honest when he bought, and arranged for his associates to buy. He was more than honest, he was fair to the Kellogg company. What he bought and paid for, in a time when the future held no single gleam of hope without his aid, he and his associates are entitled to keep and do with as they please.

It is not manly to deny a bargain honestly made. Milo G. Kellogg, if he had been personally present, might have preferred to go down in failure rather than to have done what Mr. De Wolf did in his name. But failure would have been his only alternative. Mr. De Wolf had the unquestionable authority to act in his name, and did what he believed was best for Mr. Kellogg's interests. We do not feel half so sorry for Mr. Kellogg as we would feel if his life's earnings had all been swept away in the failure of his company. Mr. Kellogg to-day is a rich man, and in TELEPHONY'S opinion has come out of the matter very luckily indeed.

As to the action taken by Mr. Barton and the other Bell men associated with him, we believe that they deserve the thanks of every Independent, both for buying the Kellogg company and for concealing the fact of their purchase afterwards. There can be no doubt that if the Kellogg company had been permitted to fail, or if its purchase by Bell interests had been immediately announced, it would have meant a set-back for Independent telephony compared to which the Everitt-Moore trouble would have been insignificant.

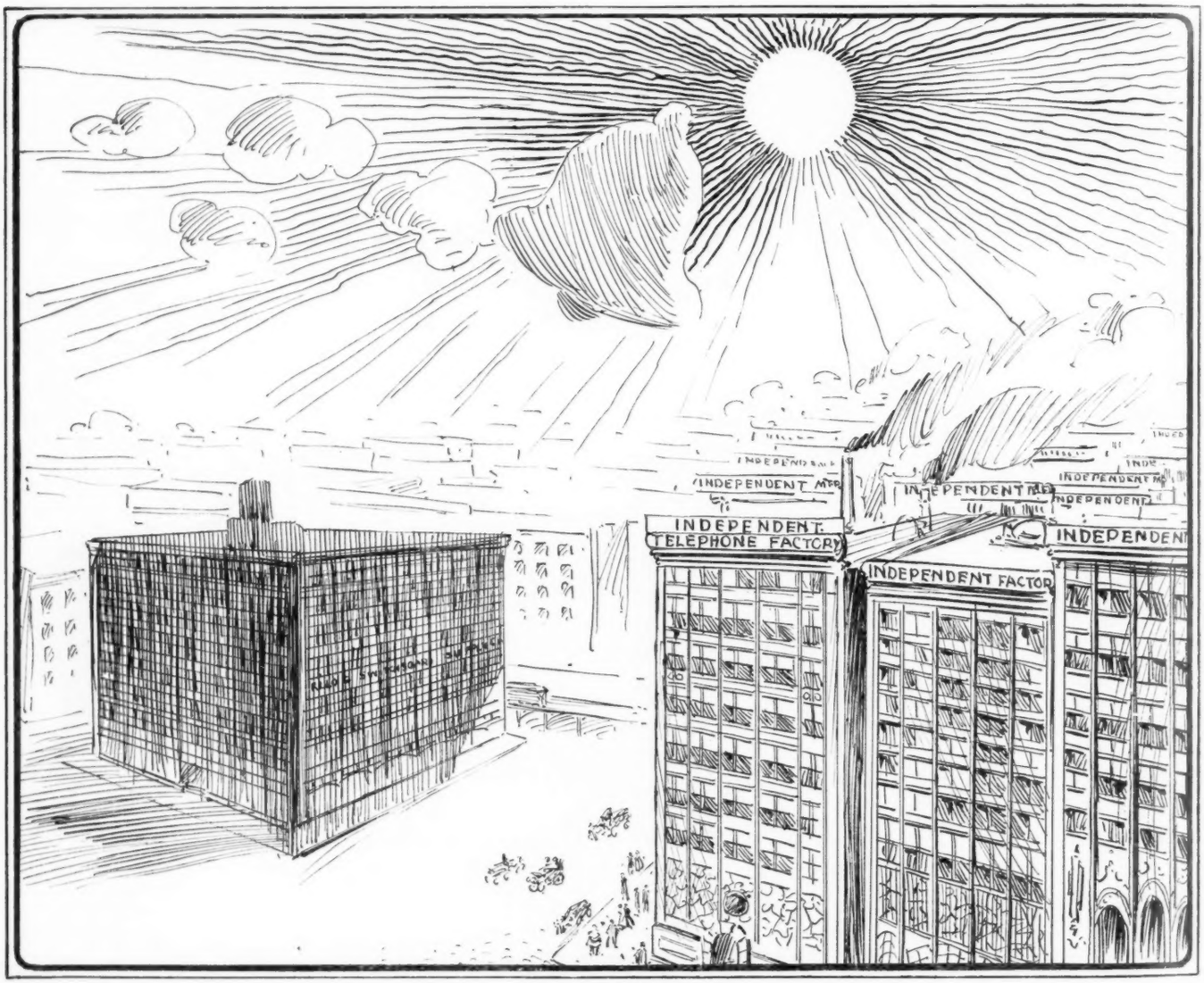
We do not impute to Mr. Kellogg any dishonest or unworthy motive in the efforts which have been made to secure the possession by him of the stock which he formerly owned. We believe that the suits have been filed and the admitted actions taken for the single purpose of setting right Mr. Kellogg and the other gentlemen interested with him in the eyes of Independents. They are suits to clear their Independent honor and are instituted for the purpose of removing any shadow of Bell affiliations from the men who have made Kellogg success in the past. But they are only personal. They do not touch the Kellogg company itself. Mr. Kellogg, Mr. Miller, Mr. Dunbar and their associates are Independents in thought. TELEPHONY does not deny their individual worthiness, but the company which they represent is a Bell company, and we propose to characterize it as such.

So much for the reasons for our attitude. Now for the plan of action which Independents should follow out.

To begin with, one thing must be clearly understood. TELEPHONY'S attitude and course of action are its own. They are not due to any other person or caused by any influence save our personal convictions. It is known that other manufacturers of telephones have made and are making capital for themselves out of the Kellogg sale to the Bell. That is legitimate business if they tell the truth. Independ-

ent telephone manufacturers, who have been and are competitors of the Kellogg company, could not be expected to overlook the opportunity which the Kellogg situation presents. They are human; shrewd business men; and hustlers for business. The Kellogg-Bell situation presents an argument in favor of their own products, and they have not been slow to take advantage of it. Their opposition to the Kellogg company, or any movement engineered by them, cannot be looked upon as unselfish and unbiased. It is, too, evidently a matter of individual interest with them. If opposition to the Kellogg company is to come only from the company's competitors in business, that opposition will probably not succeed in convincing any man who uses and prefers Kellogg apparatus, irrespective of the company's business connections. TELEPHONY *is not fighting any one manufacturer's battle, nor that of any combination of manufacturers. Our highest duty is to our subscribers, whose opinions we seek to influence. Telephone manufacturers who advertise in our columns do so because Telephony has by far the largest Independent telephone circulation of any paper published in the world. They do not, never have, and never can control or influence our editorial columns, except they act as a part of a movement for the benefit of Independent telephony in the broadest sense.* TELEPHONY does not assume this responsibility for some ideas advanced by various individuals in our reading pages, but our editorial pages are sacred, as containing our own convictions and expressing our own plans. We repeat, we are Independent, and what we say is our view, honestly stated to our subscribers.

This article is intended especially for the man who prefers Kellogg apparatus, is using it, or contemplates doing so, and who believes that his opinions do not alter his independence. We wish to be understood as saying nothing to the detriment of Kellogg apparatus, as apparatus. We have no opinion as to that. It may be very good or it may be very bad. It makes no difference with the principle here involved.



IN THE SHADOW.

Take the case of a man owning an Independent telephone exchange, using Kellogg apparatus. He finds his subscribers increasing so rapidly in numbers that he has to add to his equipment. He has been satisfied with the working of his Kellogg apparatus, and wishes, for the sake of uniformity in his construction and service, to buy Kellogg goods for his present and future needs. Salesmen from other telephone manufacturing companies argue the advantages of the switchboards and telephones manufactured by them, as compared with the Kellogg. To cap the climax, they hammer it into him that the Kellogg company is a Bell concern, which he, as an Independent, should not support with his orders. This argument does not affect him deeply; in the first place, he believes it is not impartial, but is preju-

diced by the other manufacturer's self interest, and, in the second place, the exchange man knows in his own heart that he *is* an Independent. He knows that he *is* running an Independent exchange, in an Independent manner. He knows that a good telephone is a good telephone, by whatever name it is called. He likes Kellogg apparatus, and mere sentimental reason will not make him change. He is the man we want to reach, especially, in this editorial. For the sake of convenience we will call him Mr. Brown.

Do you know, Mr. Brown, that in the time of the Revolutionary war the sturdy American independents, who helped to make our national Declaration of Independence a reality, threw a whole shipload of tea into Boston harbor as a protest against a principle which they had branded as wrong. They were tea drinkers, tea lovers, men who voluntarily, at personal sacrifice, deprived themselves of what they had come to regard as almost a necessity. They did it as a matter of principle and as a token of their Independence.

There is something in this matter of pure principle. There are men who do not need any other motive. Perhaps, Mr. Brown, the principle of the thing is enough to make you sacrifice your plans of uniformity, to take up something as yet untried by you. Perhaps, as a matter of principle, you will refuse to buy Kellogg apparatus on the ground that it is not Independent, but bears upon it the shadow of the Bell. There are a great many Mr. Browns in the United States who do look on the matter purely as a matter of principle. But there are other species of Mr. Brown who do not care to rest the decision on principle alone. They argue that it is a business question with them, involving no principle. Certain of these men will, while denying the existance of any important principle, fall in with the trend of other Independent thought, and will use some other than Kellogg goods, as a matter of Independent patriotism. Such men are like the noted American who gave the toast, "My country, may she ever be right, but, right or wrong, still my country." But if neither principle or patriotism governs Mr. Brown's decision, what then shall we say?

Do you know, Mr. Brown, that a certain great American, Abraham Lincoln, the man who achieved the independence of a race of slaves, using the words of the Bible, once said, "A house divided against itself cannot stand; this nation cannot exist half slave and half free"? The warfare of Independent telephone men against the slavery of the public at the hands of the Bell is just as much a matter of principle as was the war brought on by the existence of human slavery in the United States. The Civil War was inevitable and resulted as it did only because the issues were clearly defined, and each side in the great struggle fought unitedly for what it believed was right. Our war against the Bell company is a serious business. It is to be carried on, not as a pleasure expedition, but as a war. It must be relentless, because in fighting is our only hope of peace.

In this fight we must not be divided. We must not give aid and succor to the enemy, nor must we permit him to gain access to our camp, where he can take part in our plans and help or hinder them if he chooses. This battle must be fought out to a finish. There must be no truce, no temporary cessation of hostilities. The enemy is tireless, shrewd, rich and powerful. Above all else, our enemy is united. No Bell licensee company is permitted to use complete Independent apparatus. The Bell regulations are strict on this point. Why is it that the Bell company refuses to give connections on its lines to companies which use Independent transmitters and receivers? Is it because Bell transmitters and receivers are better than Independent? Not at all. It is in order to keep the Bell companies united on one general plan. If that is a good thing for the Bell company, it is a good thing also for Independents. If a Bell company is not permitted to use, if it chooses, an entire equipment of Independent apparatus, an Independent company should not allow itself to use apparatus made by the Bell or in which the Bell company is interested.

You may feel, Mr. Brown, that you are Independent, no matter what apparatus you buy, if you use it independently. But you have no right to be classed as such if you have upon you any trace of interest in the Bell company's plans or if you contribute in any measure to Bell success. The present operation of the Kellogg factory by the Bell interests is principally for the purpose of creating dissensions in the Independent ranks. It is the more dangerous because it is insidious. The hand of iron is concealed beneath the velvet glove. There is no question that the Bell company would prefer that Independents should all buy Kellogg apparatus. As a suggestion from the enemy, such advice should be treated by Independents as it deserves.

Suppose, Mr. Brown, you do not have the ready money with which to pay for the apparatus you require, and find it necessary to ask for outside aid, to whom would you be likely to apply first? Would it not be natural for you to go to the company which manufactures the apparatus and ask it to take your bonds or stock. If that manufacturing company is controlled by the Bell company and you permit it to have any interest in your company, you are that much in the power of the Bell. You are that much less an Independent and are imperiling your investment by being under obligations to the very enemy you fight. It does not require any great stretch of imagination to see the Bell company, the entering wedge having been driven, making itself in time a monopoly once more by the simple process of voting the stock it owns in Independent companies. Owning such stock, it can keep itself advised of the true condition of the Independent company at all times and can govern its own acts accordingly.

This brings us to another subject—the duty, Mr. Brown, which you owe to the public as an Independent. You have been given permission to operate your exchange as an Independent exchange. Your franchise probably contains a provision that you shall not sell out to the Bell. You have no right, with this contract made between you and the people, to permit the shadow of the Bell to fall upon you. You must be above the possibility of reproach. You have no right to endanger the public's right to the service of an Independent exchange. *You do endanger that right when you use apparatus made by the Bell company or its affiliated interests.* You make it possible to cripple your service and are at the mercy of your enemy.

The most strenuous efforts will be made to promote the sale of Kellogg apparatus. It is advertised in this and every other Independent paper. We have to take these advertisements when offered, *although we would prefer that our advertising columns might be free from the Bell company's taint.* It is probable that the most strenuous efforts will be made to make Kellogg apparatus as good as money can buy and that the prices will be brought to the lowest level. When a confidence man tries to sell a gold brick, he always makes it look right on the outside.

It is a homely simile, but we believe that the Bell company's purpose is to sell the Independents a gold brick through the Kellogg company. If an Independent bites, he is alone responsible, but every true Independent should be careful to so shape his course that at present or any future time it will be impossible to point the finger of suspicion at him and say he is "in the shadow."

It has been suggested, since the sale of a controlling interest in the stock of the Kellogg Switchboard and Supply Company, to the men prominently identified with the Bell, that a slight change in the company name might be made which would express its new position. It would be a happy idea to drop the initial "K" and put a "B" in its place. The name would be then much more appropriate than the present one.

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The Economic Management of Modern Telephone Exchanges

Carl C. Curtis, A. M. A. I. E. E.

THE TRAFFIC DEPARTMENT.

In the entire system of Independent telephony there exists no branch offering more evidence of a retarded development, if not positive neglect, than the operating—or traffic department, as it is ordinarily called, and yet this is the most important and vital organ of telephonic anatomy. It is a lamentable fact that the engineering and installation, as well as the subsequent operation of equipment and general government of this department have been greatly inferior to the progress of the rest of the exchange by reason of the neglect of seemingly obscure and unimportant details. In this the larger offices have been equal sufferers with the smaller ones, notwithstanding that they have presumably had the benefit of expert advice. There is no way in which the opposition has profited to as great an extent as by this combination of poor engineering and worse management of the traffic department of the majority of Independent companies.

THE OPERATING ROOM—LOCATION.

Owing to the expense of installation, the complexity of the apparatus and its connection with the wire plant, and the magnitude of the undertaking incident to the moving of even a small exchange, the central office should be located in a building by itself, and preferably one unshared by other tenants. The company owning an exchange of 500 lines or over should unquestionably have the ownership of both real estate and building vested in its name. The location of a building site is a problem for the engineer in an exchange of any magnitude, since to insure an economical layout and minimum wire plant cost, it should be located as near to the telephonic center of population as possible.

In the location of the operating room the following are essential qualifications: Isolation from the public and to a certain degree from the other departments, freedom from noise, dust, dirt and dampness, provided with direct communication with the recreation and locker rooms, and having the portion of the room in the rear of the switchboard as closely accessible to the terminal room as practicable. It should not be so placed that it is necessary to pass through any portion of it to reach any other room nor should its location be such that employees are tempted to make it a runaway in passing between other rooms or departments.

LIGHTING.

The room should be light and cheerful, with the walls and ceiling treated in quiet, restful tints. Skylighting with a means for regulating its intensity is preferable. Lamp signal boards should have the light softened, the face of the board illuminated by diffused or reflected light. Opposite conditions are desirable with target signal boards.

HEATING AND VENTILATION.

The air supplied to an operating room should be as free from dampness and dust as possible. Artificial means are sometimes adopted in large offices for securing a plentiful supply of pure and reasonably dry air. Stoves and ordinary hot air heating methods are strictly barred because of dust. Hot water or steam is best, but should be so piped that there is no possibility of steam or water from a bursting pipe reaching the cables or apparatus. In damp or rainy weather the windows of the operating room should be closed. Moisture causes rust and corosion of contacts and leakage of current across the insulation. (See Rule No. 31.)

FLOOR AND WOODWORK.

Polished and waxed quartered oak makes the best floor. Aside from appearance, oak is the best lumber for the reason that when once well dried, it does not readily absorb moisture. In first cost and subsequent maintenance, it is the most economical known, as well as the cleanest (excepting marble or mosaic)—a very important and necessary attribute. A treadway five feet in width should be laid close to the front of the switchboard, composed of the best grade of 3-16 or ¼ inch linoleum with the exposed edges protected from wear by a hardwood nosing. The same material should be used for the approaches to all desks and doors. The best is a light chocolate brown, perfectly plain in color. After it has been laid it should be given a coat or two of a heavy varnish, after which it can be waxed and polished like the rest of the floor. It looks well, wears like iron, and is noiseless. Rubber matting, once so popular for this purpose, has a short life, is expensive, hard to maintain and is said to cause blindness to those who walk on it constantly. Where circumstances make an oak floor too costly, the entire operating room floor can be covered with ¼ inch linoleum, but ordinarily it is no cheaper than hardwood.

All woodwork, flooring, furniture and cabinet work should be as plain and free from ornamentation as good taste and proper regard for appearance will permit, this in order to avoid the presence of anything which will catch and hold dust, which if permitted to lodge on the apparatus causes poor contacts and defective operation.

This may seem like a far-fetched conclusion, but the influence of the quality of the janitoring of the offices upon the service must surely have been observed. Neglect and slip-shop methods will just as surely show their effects on the quality of the work produced by the operators as slackness in the enforcement of more direct rules; therefore let every manager see that his operating room and operators' quarters are always as scrupulously clean and bright as *daily* wiping, dusting, and scrubbing can make them. A good janitress is an important factor which is often ignored in traffic management.

The secret of good service is in the operating, and the basis of all good operating lies in the efficiency and thoroughness of the discipline. This means that the switchboard room must be a place of absolute quiet, and that one must feel in its very atmosphere the necessity for good behavior. In the creation of this atmosphere the harmony of color and form of the cabinet work, furniture, floor, and surroundings, bear an influential part. It is no place for the employees of the exchange to loiter at any time, either on or off duty, nor is it a drawing room wherein operators can entertain callers when business is slack. When an operator is relieved from duty she should be required to at once leave the room. Stockholders and directors are in no sense of the word privileged characters, and are distinctly included in the policy of exclusion of the general public from the operating room.

THE RECREATION ROOM.

This is not a luxury, but a decided necessity to every exchange employing over six operators, and having any pretensions whatever towards being well conducted. Some cozy, sunny place where the operators can rest from their arduous duties, in an environment congenial and comfortable, with a few pictures, easy chairs, divans and table sup-

plied with plenty of wholesome reading matter, costs little either to furnish or maintain, and readily pays for itself in improved service. For some reason, insects have a strong affinity for telephone exchanges, and consequently when selecting the furnishings for the recreation room it is well to confine one's self to such that will not afford extensive accommodations for pests and which can be readily inspected and cleaned.

THE LOCKER ROOM—LOCKERS.

A room fitted with an individual locker for each operator, and toilet facilities, is something no office should be without. The best locker is of the type known as "expanded metal," a strong, rigid wire-like mesh punched out of sheet steel, the best size for which is about 15x15x60 inches, the doors fitted with rim locks set to a master-key. These lockers can be inspected without opening the doors, and a free circulation of air can at all times pass around all sides of their contents, rendering the accumulation of dirt, moisture, and mould an impossibility, and any untidiness on the part of the occupant is ever apparent. Good wooden lockers are fully as expensive and quickly accumulate dirt, becoming ill-smelling and mouldy in a short time.

LUNCH AND COOKING FACILITIES.

While a lunch room and kitchen are looked upon as necessary adjuncts only to large exchanges employing many operators, there is no reason why small offices cannot provide their locker rooms with modest cooking facilities which would enable the operators to reinforce their cold luncheon with a cup of coffee or some simple hot dish. A cupboard, a few necessary utensils and dishes, with a small gas or oil stove, does not cost much and is well worth the money.

INDIVIDUAL RECEIVERS AND TRANSMITTERS.

For hygienic reasons, each and every operator should be provided with and be held responsible for her own individual receiver, to be kept in her locker when not in use. In some of the modern installations, detachable transmitters, which the operators wear suspended around the neck, are coming into general use. This is an excellent plan and gives each operator both transmitter and receiver for her private use, with the additional advantage that no matter how she may move around in reaching from one part of the board to the other, the transmitter is always in the proper position before the lips. The disadvantage heretofore has been that the slight increased vibration imparted to the transmitter through being worn on the person has caused them to pack more readily than when suspended from the switchboard. It is claimed that the other advantages are ample to wholly offset this, however.

RECEIVER RACKS.

Some Independent exchanges have a rack near the operators' entrance to the operating room upon which each operator hangs her receiver or receiver and transmitter as the case may be, when she is relieved from duty. The reason that it leaves the apparatus accessible for regular inspection is insufficient excuse for the continuance of a practice so unhealthy. We know from experience that although each operator may be expected to use one particular receiver, it does not operate that way in practice, and that a girl is fully as liable to have someone else's receiver as her own. They soon learn to detect and report trouble in their talking circuits, and a regular daily inspection can be easily maintained when the operator is required to place her receiver in her locker.

INSPECTION OF QUARTERS.

The chief operator should be charged with the duty of inspecting the quarters and each locker once a day and to see that the same is kept in good order. The inspection ought to be performed regularly and thoroughly or disorder and slip-shod methods will be encouraged at a point where they can exert much harm.

THE CHIEF OPERATOR — SELECTION AND QUALIFICATIONS.

As the success of an exchange is attained or defeated by its operating force, so is the latter just what it is made by the governing power directly over it. In other words, the chief operator should be a competent and trustworthy person. In the choice of a chief operator, executive ability combined with telephonic experience is the first and most necessary requisite. Tact and judgment go in hand; faithfulness and honesty are taken for granted.

VISITS TO OTHER EXCHANGES.

It is an excellent plan to allow the chief operator to visit other exchanges whose methods are known to be up-to-date, in order that she may become and keep familiar with the best practices of the profession. A week spent in a good office where the discipline is watched carefully can do wonders with a bright girl, and it is well worth while for her employer to pay the expenses of such a visit.

Some exchanges give the chief operator some supervision and check upon the clearing of trouble in order that cases may not be lost or unduly delayed, her position being the best from which to observe results and report upon the efficiency of the maintenance department. It should be her duty at all times to watch carefully the condition of the lines both local and long-distance, and when it appears advisable for the good of the service, requisition the wire chief for inspections or repairs to any line or apparatus. The chief operator acting thus is not given any real authority over the wire chief, but all departments are, to a certain extent, subservient to the demands of the traffic; the relative importance and proper precedence of which the chief operator is unquestionably the logical judge.

Any office burdened with a nominal chief operator devoid of sufficient stamina to maintain her authority under the conditions recommended herein should at once remove her and procure one who can fill the position in a manner befitting its character and responsibility.

ACTING CHIEFS.

The operating room should *never* be left without a responsible head. When there are more than two operators on duty the acting chief should preside at an isolated desk and not at the switchboard. When only two operators are on duty one of them is designated as acting chief and is to be held strictly responsible to the chief operator, not only for her own conduct, but for that of the other as well, and also for the service given. Switchboards of 500 lines or over should never at any time have present in the operating room less than two operators, whether demanded by the traffic or not. It is bad policy to jeopardize an investment of five or six thousand dollars by depending upon the uncertain protection of a single girl liable to be taken suddenly ill at a critical moment.

CLERICAL WORK—RECEIVING TROUBLE AND COMPLAINTS.

In offices handling up to about 1,200 lines, with an ordinary load, the chief operator can, except during the busy hours, receive trouble and complaints, supply names and numbers of new subscribers, and answer inquiries. Her prime duty is the preservation of discipline, to which all others are entirely subsidiary. She should never be so encumbered with clerical work that she cannot devote her time toward the proper training of her operators and maintaining discipline. If during the busy hours the desk calls become so frequent as to render efficient monitoring impossible, an assistant should take the desk pending the rush, allowing the chief operator to patrol the floor behind the chairs. As the exchange population increases, the period of retention of the assistant at the desk will likewise increase, until she finally acquires the status of a fixture.

Right here it may be well to state that any exchange attempting to combine the positions of chief and toll operator is practicing a penny-wise and pound-foolish policy, the

combination being inimical to the profitable administration of either position, and is bound to sacrifice the efficiency and earning capacity of the exchange in whole and in part.

THE MANAGER'S RELATION TO THE CHIEF OPERATOR.

The wise manager will avoid any direct contact with the operating force, and will understand that it is the worst kind of practice for him to take it upon himself to reprove an operator, even though he may in person be witness to the fault. Of course, emergencies *may* arise when for him to remain silent would convey a wrong impression with some attendant evil results, but in nine out of ten cases, the less he says the better, reserving his forces for a private interview with his chief operator, where he can lay the matter before her as strongly as the occasion may require, *she* being left to deal with the culprit and administer justice accordingly. It is not necessary to say that the opposite course is invariably followed by newly made and youthful wearers of the manager's toga bent upon impressing their audiences with officious displays of managerial authority. The manager who respects in both word and act, the authority of his under offices over their subordinates, is contributing more toward establishing his organization on a firm foundation and securing for them the respect of those under their charge, than a thousand rules and sermons could ever do, and what is fully as helpful, is creating a valuable fund of respect on their part for himself, on the principle that "Respect begets respect." It is wrong to openly criticise the chief (or any other officer) before her operators. To do so will eventually undermine her authority and have a directly opposite effect than that intended.

THE OPERATORS—THE RAW MATERIAL.

It is generally conceded by exchange managers that the Irish-American girl, as a class, makes the best operator. She is mentally and physically quick and active. However, she needs watching, simply because of her possession of the very faculties which render her valuable as an operator. Kindness and firmness will do wonders with her, but if a person once incurs her ill-will she will make him forget all his other troubles completely. She can be easily governed by those who command her respect; but those who cannot will simply be the governed themselves.

Physically, the operator should be of at least medium height or over, with a good length of arm to facilitate reaching the farthest multiples. A clear, strong voice is essential, as is also good hearing and sight. The age limits are between fifteen and twenty-two years for beginners, with a preference for the younger in order to avoid the serious results of the inevitable ravages of matrimony which carries off the older operators.

It goes without saying that the operator should have a good common school education at least.

THE TRAINING OF THE OPERATOR.

In the education of operators, the training school opened by E. F. Sherwood, superintendent of traffic of the New York Telephone Company, about a year ago, is a departure at once novel and commendable. In this school the girls are taught the theoretical as well as the practical side of operating, under the auspices and close supervision of experts in the art. The course includes instruction in the physical make-up and routing of connections of various kinds from substation to substation, the whole illustrated by means of comprehensive diagrams. The names, uses and action of the various component parts of the apparatus are explained to them, and they are well-schooled in the use of the forms and phrases which compose the polite language of commercial telephony, learning thereby the way to sugar-coat such exasperating phrases as the oft-repeated, "the line is busy." Beginners are given ample opportunity to practice their newly acquired knowledge at a switchboard, which in every way resembles the standard commercial board used throughout New York.

Aside from the above, which is applicable only to metropolitan environment, the best method of training operators is as follows: After passing an examination by the chief operator as to her moral, mental and physical fitness for the work, she is turned over to an expert coaching operator, who takes charge of her until she is considered competent to take the board for herself. The beginner will first wear a receiver bridged to that of her tutor, for an hour or so each day, for a period of a week or ten days, in order that she may become familiar with the necessary manual and vocal movements, without attempting to operate herself. Later, the two change positions, the student operating under the eye of the coach. The coach watches every movement and corrects all mistakes. As soon as a reasonable amount of proficiency has been acquired, the teacher's receiver is dispensed with and she simply watches her pupil until she has progressed sufficiently to be trusted at the board alone between two older operators. The length of time it takes to reach this stage depends upon the individual more than anything else, but a month is about the average. In order to prevent interruptions to the service this teaching process is of necessity very slow, but it is better so, since the student is less liable to acquire bad habits than if rushed through. As soon as she is able to handle a position, the pupil is taken on as a substitute during slack hours, and as her dexterity increases she is given a permanent position as relief. Vacancies on the regular force are filled from the reliefs, the best and most advanced being awarded the prize.

CHANGING RELIEFS.

The simple process of changing the operators at the switchboard is an act far more frequently bungled than carried on in a finished manner without interrupting the service. There is but one way to do it properly, with even only one or two operators, in order to avoid confusion, and that is by a military drill. A few minutes before time for the relief to enter the room the chief operator strikes a signal on her bell for the operators to rise, and at the same moment sounds the bell in the locker room as a signal for the relief to form in line in the proper order. The chief then steps up and pulls back the chairs behind the mat to give sufficient room for the relief to file in behind the retiring operators. She next sounds the second and marching signal in the locker room and the relief marches in, each with her head telephone in place, taking up a position behind and a little to the left of the retiring operator, inserting the plug at once into the extra receiver jack. At the next bell, the retiring force steps back, passing to the right of the relief, withdrawing the receiver plug from the jack, as at the same moment the relief steps into place and immediately goes to work. The retiring operators as they step back face the direction of the length of the board and stand in position to await the signal to retire. When the relief has gone the chief replaces the chairs under the operators, assisting each to mount in turn.

Besides its value in preventing confusion, the drill has another advantage, namely: It instills in the mind of the operator the law of instant and unquestioning obedience to the commands of her superior, just as it does in the mind of the soldier. It may seem ridiculous when first tried, but the novelty soon wears off and becomes a part of the accepted routine.

CONDUCT OF OPERATORS.

Once in the operating room the operator's conversation is to be confined to that via the transmitter and then only within prescribed limits. Her voice should be inaudible to her immediate neighbors and conversation between operators calls for energetic measures. The turning of a head, particularly when some one enters the room during slack hours, or anything which indicates inattention to the signals before them, should be dealt with severely. In the exchange there should be no rule so rigidly enforced as that imposing silence

between operators on duty. Contrary to general supposition it is a relief to them rather than a hardship.

For the expedition of business the operator's vocabulary should be limited to a few concise, business-like phrases, delivered in a pleasant tone of voice, free from any suggestion of petulance.

ENFORCEMENT OF RULES.

Rules of any kind are worse than useless if they are not enforced. It is better to start in with a few well-chosen regulations and add to them as occasion seems to demand than to draw up an elaborate code at the outset and ignore half of it. If you do not care to enforce a rule, repeal it without delay. A single unenforced rule or regulation will weaken and nullify the effect of all the others. When a certain expression is adopted for use by the operators, insist upon its unvaried form in order to accustom the public and secure uniformity of action. This applies likewise to other departments, for instance: Teach members of the staff and others to respond to telephone calls with the name of the office which they hold, viz., the manager will respond with "manager"; the cashier with "cashier"; the wire chief with "wire chief"; and the chief operator with "chief operator," etc. This method saves conversation and supplies a desirable substitute for the word "hello," so inseparably connected with the telephone in days gone by.

SERVICE TESTS AND INSPECTIONS.

A service inspector is a necessity to every large exchange and a desirable aid to every small one. Tests of the service given by the operators should be frequently taken not only to ascertain the quality of the service, but as an incentive to the operators to give a better grade of it. The speed of the operators in answering should be timed with a stop-watch and their manner of replying to questions carefully noted. Learn each girl's faults and see that she is made aware of them by criticism, and by patient coaching, taught to correct them. Good operators can frequently be made of the most promising material by intelligently following this formula and the exercise of tact.

Special Inspection Report. Tel. No. .....

THE ..... TELEPHONE CO.

..... Exchange. ..... 190.....

NAME .....

ADDRESS .....

TIME IN SECONDS SERVICE TESTS.

TRAFFIC

No. Test	No. Called	Call	Time Ans.	Recall	Time ....M.	TRANSMISSION
1						
2						
3						
4						
5						
6						
Average.						

Special Inspection Report. Tel. No. .....

THE ..... TELEPHONE CO.

..... Exchange ..... 190 .....

MAINTENANCE

Name .....
Address .....
Equipment ..... No. .....
Location .....
Extra Eqpt ..... No .....
Location .....
Ex. Bells ..... No ..... Make ..... Res't ..... Prop. of .....
Protector .....
Location .....
No. Batteries ..... Kind ..... Readings .....
Running Wire .....
Drop Wire .....
Switch Hook .....
Residence or Business? .....

FIG. 12A.

In Fig. 12 is shown a form of general inspection report covering both maintenance and traffic. The blank is printed on both sides for convenience in filing. Referring to the table under "service tests," "number called," is self-explanatory. "Call" is the time of the operator in responding to the signal; "time answered" is the time taken by the party called to answer the call; "recall" is the time taken by the operator to get in on the line after the party called has hung up; "time—M." is the time of day the test was made; while "transmission" is the quality of that characteristic. On the back of the report is written a brief abstract of the subscriber's opinion of the service, with any observations the inspector may see fit to make. The remainder of the report is obvious.

SUBSCRIBERS' REPORT .....

.....

.....

.....

.....

DAY SERVICE .....

.....

.....

.....

NIGHT SERVICE .....

.....

.....

.....

REMARKS .....

.....

Special Inspector.

REMARKS .....

.....

.....

.....

.....

.....

.....

Special Inspector.

FIG. 12B.

REGULAR RELIEFS.

It is not only inhuman, but productive of unsatisfactory service and conditions to compel operators to remain continuously at the board three or four hours at a time. The work is very trying on the nerves and an operator ought to be relieved every two hours and be permitted to rest for twenty minutes to half an hour. This necessitates a relief for every eight operators, but it is quite necessary and will prove most satisfactory.

TOLL-ROOM.

Wherever possible to arrange it, except in exchanges of the smallest size, the toll board ought to be located in a room by itself but accessible to the main operating room for convenience and economy in night operating. Long-distance circuits are not always in such condition that they will clearly transmit speech carried on in a low tone, and the loud talking wears upon the nerves and distracts the attention of the local operators. Furthermore, by virtue of their positions, toll operators must be permitted greater freedom of speech

with subscribers and with each other, and this has by example a derogatory effect upon the general discipline. Composite telephony and telegraphy is fast developing as a revenue-producing adjunct to toll line service, and the installation of the Morse key and sounder will render obligatory the isolation of the toll lines in many offices.

THE TOLL-BOARD.

It is a mistake to equip toll boards with more than ten lines, although some companies endeavor to handle the traffic of thirty toll lines with one operator. It is a good operator that can take care of the business accruing to three busy lines and do it thoroughly. Toll trunk circuits between toll and local boards should be so arranged that the toll operators can ring their parties direct without depending upon the local or trunking operators for this service. Busy-back signals between toll and local to enable the toll operators to reserve busy local lines for their call as soon as cleared, ought to be installed in every exchange above 500 lines.

THE CHIEF TOLL OPERATOR.

Except in large exchanges handling a heavy traffic, the business is not of sufficient magnitude to warrant the creation of this position; but where a force of five or six operators in the course of twenty-four hours is needed to handle the traffic of two or more positions, it becomes expedient to have this branch of operating under the direct supervision of a competent head.

THE TOLL OPERATORS.

Some exchange managers appear to have a singular tendency toward filling toll board positions with their most ignorant, saucy and incompetent operators. It does not follow that because an operator can give satisfaction at the local board that she possesses the particular characteristics that will lead her to handle toll circuits to the best advantage. As a rule, a really good operator is good no matter where she is placed, and there are very few good toll operators who are not adepts at the local positions. The very best operators should be selected for toll work. To be a good toll operator requires patience, firmness, a cool head, and a much better education than will meet the requirements of a local operator.

They should be thoroughly conversant with the physical condition and properties of the circuits which they manipulate. It is just as essential that they know whether a given line is iron or copper, as where and at what points it terminates. They should be able to comprehend the difference between a through line and a bridged local line and should know better than to connect a long through copper wire to an iron line when a copper circuit is available to the same point. They should be taught to discriminate intelligently in routing business, and if the same point can be reached in two or more different ways, which is the better for certain classes of business. Every extra moment a toll line is retained by operators in passing details of their calls or arguing disputed points represents a loss of revenue. They should state their business with each other and with subscribers in the most concise language possible, and avoid the retention of circuits no longer than is sufficient to accurately transact their business.

PRECAUTIONS TO INSURE COLLECTION OF TOLLS.

When the toll rate is distinctly stated in every case before the connection is made up, the lapse of each message period during conversation, and the amount of the charge given the subscriber at its close, there is but very little margin left for controversy when the bill for the service is presented. Unless cautioned occasionally and penalized for violations, operators are apt to become careless with regular customers and allow the rules to fall into disuse. Toll operators should be made responsible financially for losses accruing to the company through their failure to carry out instructions in specific instances. One or two lessons of this kind will teach them to be more careful and exacting in the execution of the details of their messages.

POLICY—CALLING FOR CONNECTIONS BY NAME.

This is a most pernicious habit of subscribers to ninety-five per cent of the small and medium sized exchanges. To prevent it, calls for more courage than most telephone managers can muster, together with an unlimited supply of tact, patience and firmness on the part of the chief operator, and unswerving obedience to the strict letter of the rules from the line operators. When the rule is once inaugurated there must be *absolutely* no discrimination in favor of anyone, no matter what their social, business or political influence may be, one single departure being sufficient to destroy the value of the entire lesson and efface public confidence in the sincerity of the company's relations with subscribers.

Calling by name has nothing whatever to commend it in a busy office, neither to the subscribers, the operators or to the company. The subscriber imagines he is obtaining speedier and more accommodating service from the office which permits connections by name, simply because he is not witness to the delay and confusion caused at the switchboard by his ignorance, and the action of the exchange which prohibits the practice and stands by the rule is regarded as arbitrary. The best procedure is as follows: Send each subscriber a postal card notice to the effect that owing to the large amount of business being handled, it will be necessary after a fixed date for all subscribers to call by number only if they desire prompt service, and that if for any reason they cannot find or learn the number that they can ascertain the same by calling the chief operator, the exchange will adhere strictly to this order and give better service from the day of its inauguration.

THE COMPLETION OF CALLS.

Every call coming into the exchange should be completed, if it is within the range of possibility to do so. Companies operating principally or entirely on a measured service basis find that it is directly to their interest financially to complete all the calls they can. A line out of order, a "busy" or a "don't answer" means a loss of revenue if some means is not provided for completing the call. This is accomplished by having desk monitors whose duties require that special effort be made to raise the party called after the line operator has exhausted all her resources to the same effect. It is the duty of the monitor when given an uncompleted call to keep at the line until she ascertains positively the reason for the failure, and in the case of trouble, she puts the wire chief on the scent for immediate clearance.

In all exchanges, lines patronizing toll lines extensively, should be carefully watched, frequently tested, and when trouble occurs to them promptly cleared. If a long distance call comes in for a line in trouble, the case ought to take precedence over all others and the first available trouble man assigned to it in order to save the message if possible. Time and attention devoted to devising ways and means for the completion of connections is not lost anywhere, and forms one of the secrets of successful exchange management.

RECORDS AND REPORTS.

The following records should be kept at the chief operator's desk: The working directory, or alphabetical list of subscribers; the street directory, or list of subscribers by streets; the numerical directory, or list of subscribers by telephone numbers; a record of complaints and a summary thereof; a record of "don't answer" and "busy" calls for particular lines; service tests; and peg-count reports. All the above furnish the material for the compilation of the chief operator's monthly report to the manager.

THE ALPHABETICAL LIST.

For this purpose, a 5x3 card index is by far the best, the handiest, and cheapest form. For an index of 800 to 1,200 names select one with guide cards giving 160 to 200 alpha-

betical sub-divisions, with larger and smaller lists in proportions. Each listing of a telephone requires a card filled back of the proper guide. A form for this card, showing front and back is given in Fig. 13a and 13b. Telephones listed

Name ..... Tel. No. .....
Street .....
.....
Location of 'Phone .....
Extra Equipment .....
Date Installed ..... Rate .....
Contract No. .....

FIG. 13A.

more than once will have the extra listing noted on the back of the subscriber's card, and under the proper alphabetical sub-division. Another card (preferably of different color)

MATTER FOR DIRECTORY

Business .....
.....
Extra Listing .....
.....
.....
.....

FIG. 13B.

will be filed with the extra name. A list so made up will greatly facilitate the compilation of directory copy.

THE STREET DIRECTORY.

A card index is preferable for this list also. The guide cards can be made up by purchasing guide cards with "quarter cut" tabs upon which can be pasted the names of all the streets of the town, the guides being arranged in alphabetical order. The record cards are made out on horizontally ruled

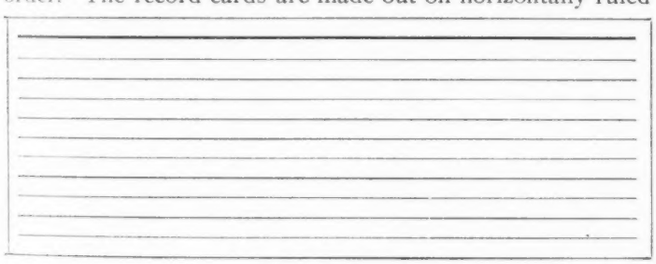


FIG. 14.

stock cards 5x3 inches in size and in the manner indicated by Fig. 14. It will be noted that the street number is placed in the upper right hand corner. The cards are filed back of the proper street guide and in order of house numbers to facilitate location. This record is of value in locating the nearest telephone to a certain place and also in making up inspection and collection routes.

THE NUMERICAL LIST.

The numerical list is used by the chief operator principally for the assignment of telephone numbers to new subscribers. It is made up on 5x3 tabbed cards, like the wire chief's numerical list, only smaller. The cards need not be printed (or even ruled if written out on a typewriter) the matter on them is the same as in the street directory except that the telephone number is placed at the upper right hand corner instead of the street number. Guides by tens and hundreds are used.

THE COMPLAINT REPORT.

This is a large sheet, 11x17 inches in size, ruled and printed as shown in Fig. 15. Upon it all reports of trouble or complaints of the service are entered, whether reported by operators or subscribers, and pertaining to maintenance or traffic. Referring to the figure: "Case Number" is the number of the case on the wire chief's trouble sheet,—and is assigned by him when he signs for the case. It refers to actual trouble only and appears on the inspection slip taken out by the trouble man. "Taken By" is the space reserved for the wire chief's signature whereby he assumes all responsibility for each item.

In reporting complaints and trouble, abbreviations are freely used to cover all common cases, with the addition of any explanatory matter necessary to render the report complete. The following code is a useful one, applicable to common battery offices: CC—cannot call; SL—steady light; CH—cannot hear; BDR bells don't ring; Ny—line noisy; CO—cuts out; OO—out of order; Ft—faint; O—open; Xd—crossed; Grd—grounded; DA—don't answer; ?—inspection; NL—no light; Mgr—manager; Cf—chief operator; Wcf—wire chief; Opr—operator; Sub—subscriber; Chr—cashier. As far as possible complaints from subscribers ought to be reported in detail, especially if profane languege is used, in which case it is advisable sometimes to get a stenographic report. Trouble reported by the manager ought always to take precedence over all ordinary trouble.

METHOD OF CHECKING TROUBLE.

Each morning, inspection slips and trouble reports for the day previous are sent in to the chief operator to be checked with her complaint report for that day, in order to prevent the loss or neglect of a single case, and make sure that all cases are receiving proper attention. The report is not filed until every case reported thereon is shown to be clear by the inspection slips, which latter are filed each in a numbered envelope corresponding to the telephone number to which it pertains.

After being checked by the chief operator the reports are sent to the office where a clerk files them until the end of the month when the time consumed in clearing each case is taken off the wire chief's sheet and the cost thereof entered in the cost record cards belonging to that line, a full explanation of which will be given under Maintenance. The real object of a system so elaborate is to insure the clearance of every case and prevent loss by carelessness or neglect.

THE "DON'T ANSWER" RECORD.

A small canvas and leather covered blank book 5x8 inches in size with record ruling is well suited for this purpose. Each page is ruled vertically in two groups of four columns each headed, "No. Calling," "No. Called," "Time," and "Report," respectively. The ruling can be done by the

TRAFFIC DEPT.

THE ..... TELEPHONE COMPANY.

Complaint Report for ..... 190.....

Case No.	Tel. Number	NAME	LOCATION	TROUBLE REPORTED	Reported by	Time Reported	Taken by

FIG. 15.

monitors at night or other times when not busy. See Fig. 16.

It is used thus: If 986 calls for 1065, and three rings fail

.....TELEPHONE COMPANY.

Date.....

No. Calling	No. Called	Time	Report	No. Calling	No. Called	Time	Report

FIG. 16.

to bring a response, the operator returns "Don't Answer" to the calling subscriber, and reports the fact to the desk for record. The chief enters the operator's report, the time and the probable or known cause of failure to answer, using the

TRAFFIC DEP'T.

THE.....TELEPHONE COMPANY.

PEG-COURT REPORT.

.....Office .....190.....

Whole No. Stations..... Whole No. Lines..... Average No. Calls per line.....

Positions	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Total
No. Lines																
1 a.m.																
2																
3																
4																
5																
6																
7																
8																
9																
10																
11																
12																
1 p.m.																
2																
3																
4																
5																
6																
7																
8																
9																
10																
11																
12																
Totals 24 hrs.																
Totals 7 a.m to 5 p. m																
Average 24 hrs																

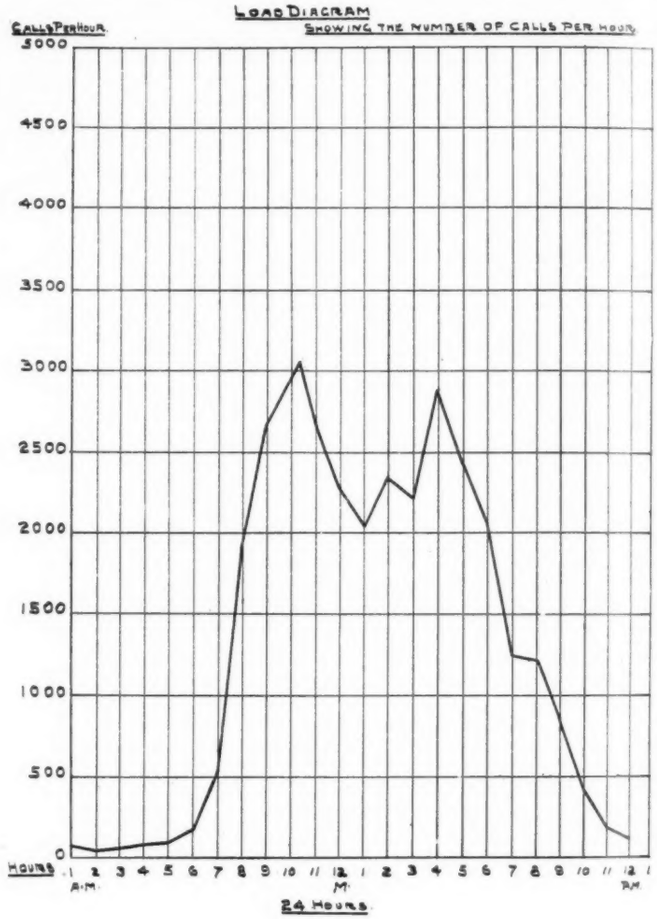
REMARKS: (If special occasion so state.).....

Signed

.....Chief Operator.

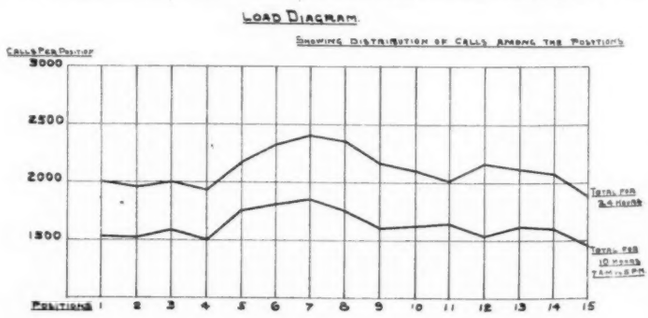
FIG. 17.

code phrases, OO or DA. If the telephone in a busy grocery, for example, is temporarily out of order, all calls for that line will be recorded at the desk and as soon as the service is restored the chief will call the subscriber and give him the numbers who called for and failed to reach him.



Repeated DA reports are entered on the complaint report for test and inspection.

If the calling party is too impatient to wait for the operator's return of "Don't Answer," no record can ordinarily be made. It is to be regretted that such is the case, for many times it may be impossible for the party called to reach the telephone in time to catch the call before the other party has



hung up and the connection cleared. Under these circumstances it is very difficult for the optrators to remember the originating number to the annoyonce of the subscriber and the embarrassment of the exchange. The nearest thing to a remedy is to instruct the operators to report every observed failure to obtain service. The full value of this method cannot be fully appreciated until after actual trial: it is perfectly practicable in any exchange, large or small.

THE BUSY LOG.

This is on the same principle as the preceding record, except that it applies to calls lost by lines doing a large business, owing to being busy when called. A record of the busy reports for all such lines is kept by itself, and once a month a statement of the number of calls lost is sent to the subscriber with the suggestion that another line will prevent those calls from going elsewhere.

THE PEG-COUNT.

The peg-count is a record showing the number of calls handled by each operator's position for each hour of the day. The calls are registered by small meters or counters designed for the purpose, and manipulated by the operator. The result of each day's count can be made up in tabular form so as to exhibit the number of calls for each hour, the total per position-day, the total per exchange-hour and the grand total per day. From the table thus formed a curve can be plotted showing graphically the fluctuation of the traffic load as the day progresses. As some special technical knowledge is necessary both for the construction and application of the diagram, we will refrain from taxing the reader's patience with any exhaustive demonstration of the method. It will be sufficient to say that the diagram shown in Fig. 18a is constructed from the total shown in Fig. 17 and indicates graphically the total number of calls for each hour. In plotting these curves the number of hours are laid off on the horizontal lines or absissas and the number of calls on the vertical lines or ordinates. Diagram 18b is a curve giving the relative number of calls handled on each position, the upper curve showing the load for 24 hours, while the lower one gives it for 10 hours. Both diagrams are plotted in precisely the same manner except that in the case of the second, positions are used instead of hours for the absissa. The first diagram is guide for the number of operators needed for each hour of the day, while the last two indicate the relative traffic loading of each position, that is, the number of lines, busy and slack, which each operator can safely handle.

While the peg-count can be put to good use in small offices, its value is not so apparent as in the large ones, where the size and distribution of the operating force, as well as the distribution of lines between positions becomes to a greater or less degree, a mathematical problem. In making this distribution of the force, the average ability of the operators, the number of calls to be handled through the different hours of the day, the number of operators is determined for each period, and their distribution among the positions is decided by the relative business importance of each position to the others must be fully considered. The number of calls the average operator is able to handle advantageously, depends upon the quality of the equipment, the kind of service, and the individual ability and dexterity of the operator. On a supervisory multiple board an "A" operator should be able to handle 200 calls per hour and give good service, providing there are no measured or pay-station lines on her position.

The load is subject to constant shifting from season to season and varies also with the natural growth of the exchange. It is a part of the chief operator's duty to watch this load through the medium of semi-weekly peg-counts and proportion her force so as to care for the traffic economically. The peg-count is by no means to be considered an arbitrary measure of the requisite force, but it forms a basis for intelligent and accurate action, and is the key to economical business-like traffic management.

THE ..... TELEPHONE CO.

CHIE OPERATOR'S REPORT. Month of ..... 190.....

SERVICE.

EPCHANGES	COMPLAINT REPORTS				SERVICE TESTS		NO. POSITION HOURS PER DAY		SALARY RATE PER HOUR	
	Complaints		Mtee.	Traffic	No. Tests Made	Average No. Secs.	Local	L. D.	Local	L. D.
	Sub's	Opr's								
(Length optional)										
T TAL.										

TRAFFIC

EXCHANGES	DAILY PEG COUNTS						LONG DISTANCE			
							Av. Daily No. Mess.		No. Mess. Lost	
	Max.	Average	Per Line	Per Pos-Day	Per Pos-Hr.	For Month	Sent	Received	Sent	Received
(Length optional)										
TOTAL.										

TRUNK TRAFFIC "BUSYS"

TRUNK LINE	FREE CALLS Av. Daily No.		PAID CALLS Total No.		BUSY CALLS			
					LINES	Calls	LINES	Calls
	In	Out	In	Out				
(Length optional)								
TOTAL.								

Cost Operating per M Calls, $ ..... Name of Operator, showing Best Test .....

" " " Station, $ ..... " " " " Poorest " .....

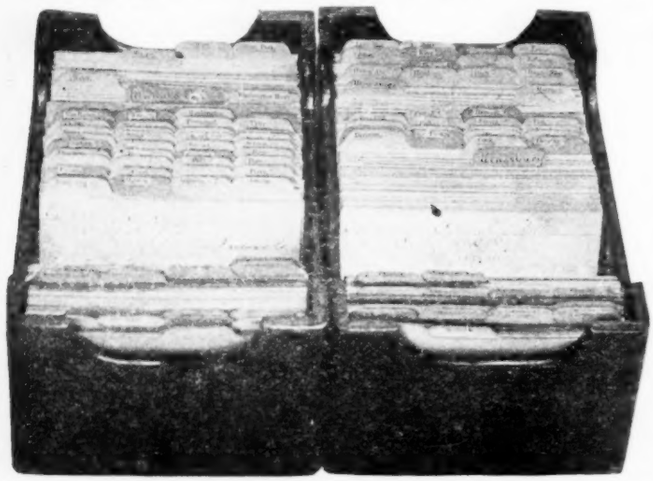
REMARKS: .....

CHIEF OPERATOR.

FIG. 19.

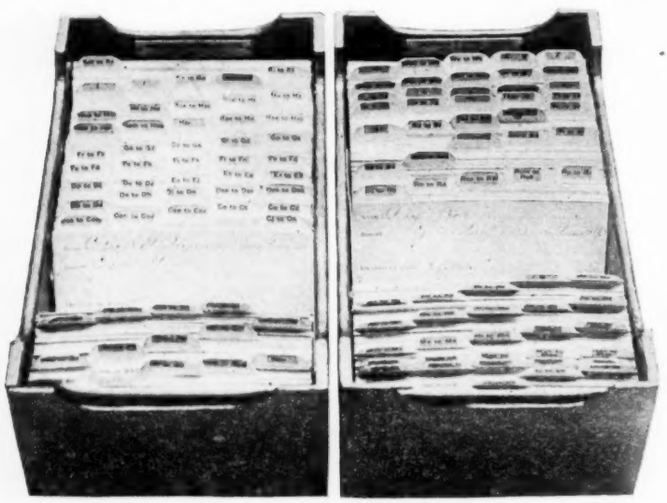
THE INTERMEDIATE RACK AS AN ECONOMICAL FACTOR.

In the earlier installations of Independent equipment the intermediate rack was an unknown quantity. Engineers who did know of it failed to appreciate its advantages and imperfectly understood its office, and besides this there were obstacles in the patent office which prevented its general adoption. In a large plant, especially it is an essential to economical operating, for through it the load between positions can



CARD CASES FOR STREET DIRECTORY.

be equalized without changing the telephone numbers. This distribution is effected with the peg-count as a guide. To illustrate, comparison between two exchanges in the same city is made. The conditions as to size (5,000 lines) and call-rate were about equal. One exchange has an intermediate rack and the other has not, and the first averages an operating efficiency of over 150 and the second only seventy-five calls per position-hour, respectively. This means that the exchange with the intermediate rack is handling the same amount of business with one-half the operators required by the other, and furthermore, in the first case the operators are quite uniformly busy, while in the second instance half are grossly overworked while their neighbors are idle. The results in the second case are not only expensive but unsatisfactory to the public and to the company.



CARD CASES FOR ALPHABETICAL LIST.

"Calls per position-hour" is found by dividing the number of calls for twenty-four hours by the sum of the hours on duty of the entire local operating force for that period, including the chief operator and her assistants. It represents the efficiency of the exchange and forms a basis for a comparison of exchanges of approximately equal size.

CHIEF OPERATOR'S MONTHLY REPORT.

In order that the manager can be kept informed of the progress of the traffic department the chief operator should be required to render to him a monthly report showing the character and magnitude of the traffic handled at each exchange. Fig. 19 has been devised for this purpose. The manager can see from this statement whether this office is gaining or losing from month to month, in the amount of traffic, quality of the service, and cost of operating.

THE ZINNEL SYSTEM.

The plan adopted by Frank Zinnel of Savanna, Illinois, for putting telephones in for farmers is rather unique. He has so many orders that it is necessary to take a wagon load of telephones for installation. In the accompanying illustration is shown a load of telephones preparatory to a story for the farming country. The territory served by Mr. Zinnel's company is a very prosperous one, and the telephone is coming into general use among all classes of people.

THE HAMILTON CASE AGAIN.

In the last issue of TELEPHONY mention was made of the fact that the Bell company had been granted an exclusive franchise in Hamilton, Canada, for five years. While this is true, it does not seem that this franchise is valid. The following letter from the leading firm of attorneys in Canada infers that the Bell may have a rocky road to travel before this question is finally settled:

We notice your editorial in this month's issue on Bell company methods in Canada. The City Council gave the Bell company an exclusive franchise for five years. We are sending you copies of last night's Times and Herald, which are Bell papers here. We may say that we consider that the municipal council has no power to enter into any such agreement, the authority granted to the municipality to enter into any such agreement having been conferred by the local legislature, which has no jurisdiction to authorize municipal councils to pass such legislation. If there is any authority to invest councils with such power, it must come from the Dominion Parliament and the question might then be raised whether or not even such legislation was not contrary to public policy.

Yours truly,

NESBITT, GOULD & DICKSON.

From having one of the best telephone services in the world ten years ago, Honolulu now has one of the very worst. The complete unresponsiveness of the company to the public demand for a reliable service will probably result in an entirely new system for the island installed by another company. Guy Owens, an American who has spent a number of years in Honolulu, is at present perfecting arrangements to put in a new system and has a new company organized. The next year will probably see a modern telephone system throughout the entire island.

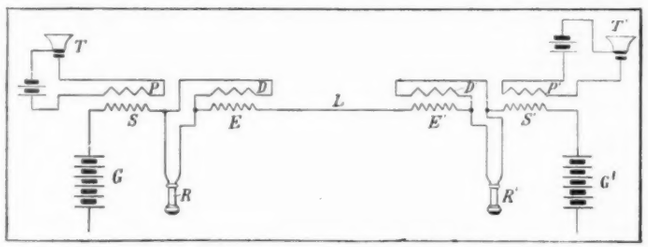
DIGEST OF TELEPHONE AND KINDRED PATENTS

Information concerning any patent will be furnished without charge by addressing Edward E. Clement, Editor of this Department, McGill Building, Washington, D. C.

736,489—C. G. Burke, telephone apparatus.

In recent issues we have noticed a number of patents granted to Mr. Burke for telephone systems in which the line is composed of a single conductor. In the present case the others are referred to, and the invention is stated to be an improvement over the constructions therein disclosed.

In the figure herewith, L is the single line wire, terminating in batteries G and G'. T and T' are the transmitters at the two stations shown, each included in a local circuit including also a suitable battery and primary P or P' of induction coil whose secondary winding, S or S', is connected in the line. The receivers R and R' are in series in the line, as usual, but each has an inductive connection in addition to its direct connection, comprising the primary winding D or D', corresponding to the secondary E or E'. Mr. Burke does not claim to be the first inventor of a single ungrounded line terminating in condensers or the like, but he says he



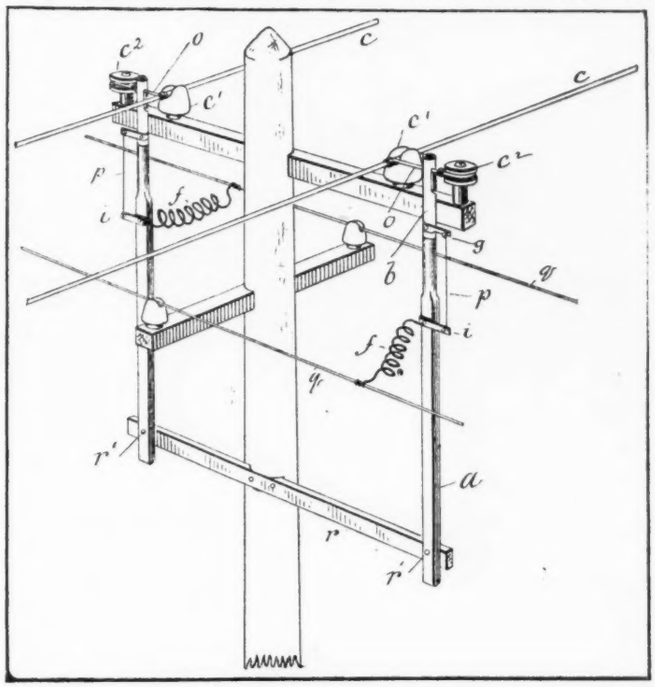
736,489—TELEPHONE APPARATUS.

is the first inventor of the ungrounded single wire ending in battery connections. His claim is as follows:

2. In a telephone system the combination with an ungrounded line wire or conductor, of accumulators of electricity connected to the terminals of said line, local circuits at the ends of the line, induction coils having their fine wire coils connected to the line and their coarse wire coils included in the local circuits, and telephone receivers the coils of which are connected to both line and local circuits, as set forth.

736,502—Thomas E. Daniels, Jr., circuit breaker.

This is really a circuit maker, instead of a breaker, consisting essentially of a rod with a metallic hook at the upper end of it to take over a line wire to connect a branch circuit thereto, usually for temporary use. In the figure a is the insulating rod, and b is a metal tube attached to the upper end thereof. A slot is cut in the side of the tube and extended upwardly to leave a tongue, constituting the hook referred to. A flat leaf spring is run up into the tube from the lower end and secured below the slot, so as to press against the front wall of the tube. When the device is hooked over a wire, as shown in the figure, therefore, the spring is kept pressed closely against the wire and maintains a good contact. c-c are the main line wires, and q-q the branch wires. A pair of rods a, and tubular hooks b may be used as shown, connected by a cross arm r secured to the pole, to prevent accidental displacement or shaking by the wind. In the case illustrated, a high potential circuit is tapped, and a fuse p is mounted between arms g and i on each rod, the lower arm i being connected to the branch circuit by a flexible conductor f. Connection may be made directly with the line wires c-c, but as an alternative, short

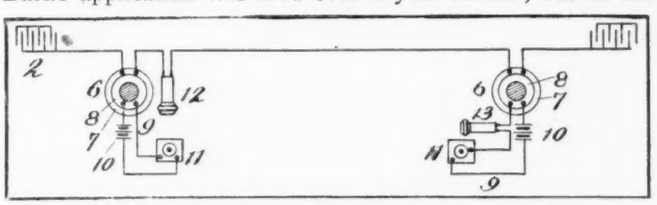


736,502—CIRCUIT BREAKER.

side extensions o-o are shown, supported by separate insulators of their own.

736,548—R. A. Ripley, electric system of transmission.

This is another single wire system of transmission, like the Burke system noticed previously. It appears that Mr. Burke's disclaimer of the line terminating in capacity bodies was in favor of Mr. Ripley, who claims this feature broadly. The Ripley application was filed June 13, 1902, while the Burke application was filed over a year earlier; but as the



736,548—ELECTRIC SYSTEM OF TRANSMISSION.

Ripley invention and patent are assigned to Mr. Burke and his associate, John Q. A. Whittemore of Boston no present significance attaches to the dates.

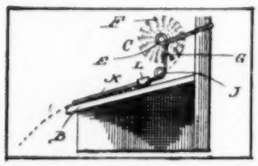
In the figure, *1* is the line, terminating at each end in a capacity body such as a condenser, *2*. *6* is an induction coil having its primary *8* connected to the local circuit *9*, which includes the battery *10*, transmitter *11*, and receiver *13*. At the station on the left the receiver, *12*, is shown directly in the line. The secondary *7* of each induction coil is to line.

Apparently Mr. Ripley's invention is not limited to a telephone system, but contemplates the inclusion of all systems employing the peculiar kind of line shown. Claim is as follows:

1. In an electric system a single ungrounded metallic line, a capacity body connected to each end of the said line, a local circuit, an induction coil having one of its coils connected to said line and the other of said coils connected to said local circuit, means for producing electrical disturbances in the said local circuit, and means for detecting the said disturbances produced in the said line.

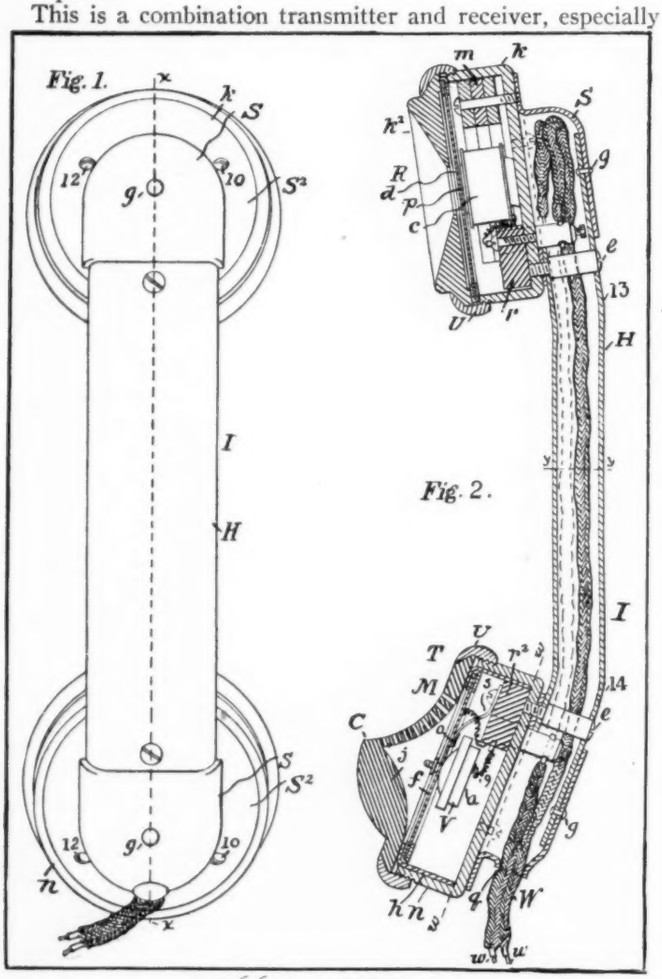
736,556—William H. Sherman, paper holding device for telephones.

This is a paper-roll holder for telephone wall sets. It is simplicity itself, consisting merely of a wire bent to form a frame or bail *K*, to rest on the desk, with upwardly bent arms, forming loops *J* and *E*, and ends extending back into hooks which embrace the backboard between them, holding the device in place. In the upper pair of loops, *E*, the spindle of the paper roll *F* is supported. A strap *L* extends and is clamped across the members *K*, the paper being led down from the roll and forwardly under this strap, as shown in dotted lines.



736,672—J. A. Barrett, L. A. Falk and H. E. Shreeve, telephone.

This is a combination transmitter and receiver, especially



736,672—TELEPHONE.

adapted for use by linemen, inspectors and other employes. It comprises two watch-case instruments secured together by a bent tube, through which the cord conductors pass; and of necessity the claims in the case are all somewhat limited, for the construction thus broadly stated is old and common. The distinguishing features of the invention are two in number. The first is the use of a cap secured to the back of a watch case instrument, inclosing the binding posts and admitting the end of a tube to connect the instrument to another. The second feature is the shape or configuration of the transmitter mouthpiece.

In the figures herewith Fig. 1 is a back view and Fig. 2 is a longitudinal section of the complete combination. *R* is the receiver and *T* is the transmitter, each having a "watch case" inclosure, upon the back of which is mounted a cap *S*. The cap on the receiver has one opening to receive the end of the flat tube *H*, which is secured to it by the rivet *g* and the screw *e*, the latter also serving to assist in securing the cap *S* to the shell of the instrument. The cap *S* of the transmitter has two openings, one to admit the end of the tube *H* and the other *q* to permit the passage of the conducting cord *W*.

The receiver *R* is set on the tube at a slight angle, by means of the bend *13*; and the transmitter is set at a greater angle by means of the bend *14*; while the effect of the latter bend, to bring the diaphragm *f* within direct range of the voice waves, is increased by making the mouthpiece or cap *C-M* with a curved perforated upper portion *M*, and a lower solid portion *C*. The transmitter is of the granular button type, with the button directly supported on the diaphragm, as shown. The receiver is of the usual pattern, with laminated three-fourths ring magnets. It is to be noted that both instruments are in themselves of standard types, and the only special appliances needed in making up the combination sets are the caps and tubes, *S* and *H*, and the mouthpieces *C-M*.

41,009—Chicago Writing Machine Company, trade-mark.

This trade-mark is used in connection with telephones and consists in the word

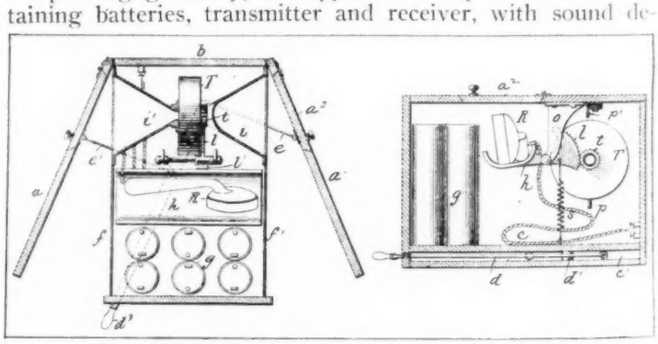
ADJUSTAPHONE.

The mark is particularly applied to telephones mounted on folding holders.

737,242—M. R. Hutchinson, telephonic apparatus.

This invention is a portable telephonic apparatus intended to be used by persons with impaired hearing, as, for instance, in a public hall or theater, where sounds are transmitted through some distance and are not easy of appreciation except by those with normal faculties.

Speaking generally, the apparatus comprises a box containing batteries, transmitter and receiver, with sound de-



737,242—TELEPHONIC APPARATUS.

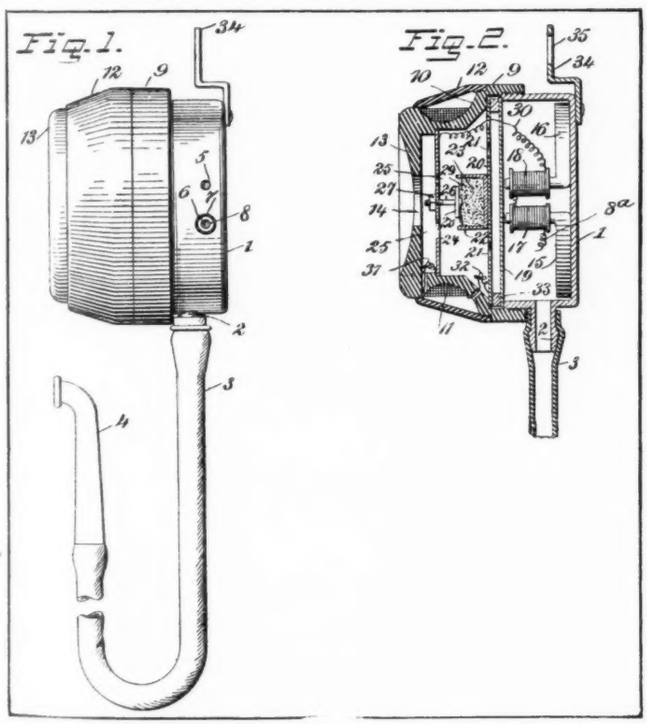
flecting sides or doors, which may be opened when desired, and when closed will completely inclose the instruments. In the upper figure, which is a horizontal section, the box *b* appears with its two sides or doors *a* and *a'* opened by means of the lever *d*, connected to them by the links *e* and *e'* and worked by the handle *d3*, which protrudes from between the real and false bottoms of the box. *T* is the transmitter,

mounted to turn on the ends of the funnels *i* and *i'*, and having a pinion *t* on one side, with which a toothed segment *l* meshes. This is best shown in the figure to the right, which is a vertical longitudinal section. The segment *l* is carried on a lever pivoted to one side of the transmitter, and carrying also a pan for the receiver when not in use. The segment end of the lever is adapted to be pulled down by the spring *s*, to turn the transmitter until the pin *p* strikes against the stop *p'*. The jar of the pin against the stop, together with the rapid rotary motion imparted to the transmitter when the receiver is taken out for use, are intended to thoroughly agitate the carbon granules and prevent packing, keeping the instrument sensitive all the time. The pin and stop may also serve to close the instrument circuits.

In both figures the batteries are indicated by the letter *g*. In the top of the box is a small door *a2* for the removal of the receiver, and other small doors *a3* may be opened when desired to use the transmitter without opening the large doors *a* and *a'*. The whole apparatus is supposed to be light enough to be carried about.

737,345—H. G. Chalkley, telephone test instrument.

This is a combined granular transmitter and magneto receiver in one casing for test and other purposes. A common mouthpiece enables both instruments to work concurrently, so that if in tapping onto a line current be found, there will



737,345—TELEPHONE TEST INSTRUMENT.

be cumulative effects, but if the wire is dead magneto transmission will still be effected. For use as a receiver an ear tube is provided.

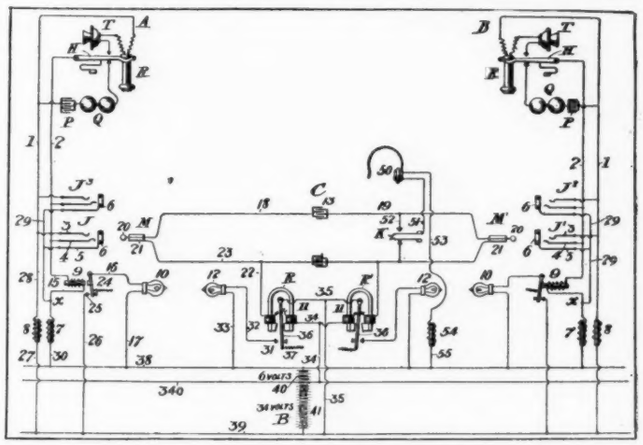
In the figures *1* is a shell or casing with a nipple *2* and ear tube *3-4*. The nipple *2* communicates with the chamber of an ordinary watch-case receiver, upon whose diaphragm *19* a second diaphragm is superposed at *20*, separated from the first, however, by a washer *33*. The second diaphragm is perforated and is rather flexible. Over it is secured a cap *9* having an opening *14* in its end, and an external channel or recess *10*, in which is wound resistance wire *11*. The connections are from a pair of sockets *5* and *6* in the side of the shell *1*, one—*6*—being insulated. The magnet windings *17* and the microphone *23* are in series with each other, and the resistance *11* is in shunt of the transmitter.

In speaking the diaphragms *19* and *20* do most of the vibrating, the diaphragm *24* being comparatively stiff and perforated besides. If there is current on the line, both microphone and magneto send waves to line; and if there is no current the magneto alone transmits. For receiving the effect is uniform. The resistance wire *11* is used for adjusting the resistances of the receiver and microphone circuits relatively.

12,156—J. William Lattig and Charles L. Goodrum, telephone system—reissue.

This is a reissue of original patent No. 722,367, granted the 10th of March, 1903. The patent was fully digested in our issue of April 1 last, so only a brief sketch will be given here. The only change in the patent made by reissue is the omission of two claims.

This is a common battery system with automatic signals, both line and supervisory. The line signals are restored by



12,156—TELEPHONE SYSTEM.

short circuits around the relays established in plugging in; while the supervisory signals are controlled by a division of the main battery, the operator closing a circuit including the supervisory relay and one part of division of the battery when she plugs in to work the relay, and the subscriber closing the circuit of the other part or division of the battery through the relay, when he answers, to restore. The operation depends primarily on the division of the battery, and secondarily on its being divided unequally, the common return of the supervisories going to the intermediate point and the control of the larger battery division being given to the subscriber.

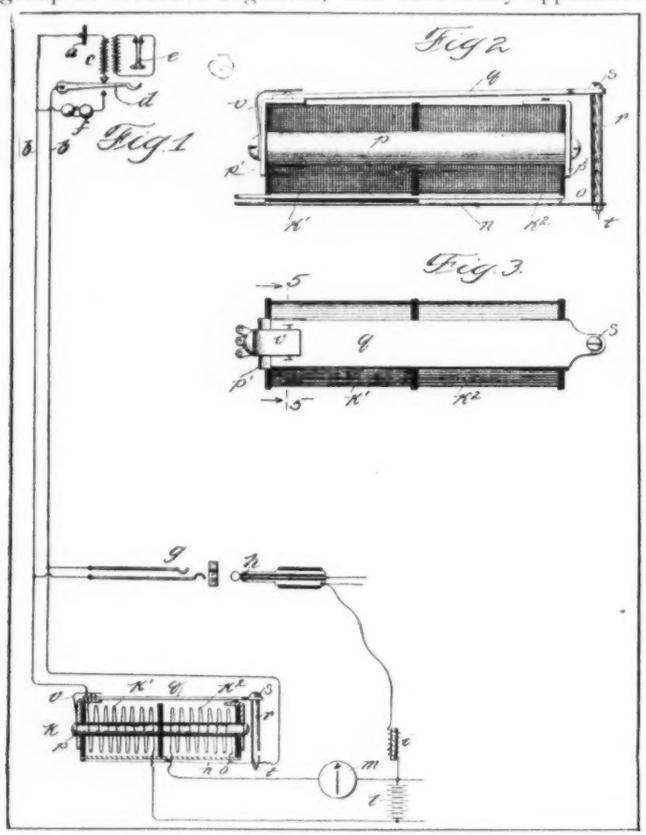
In the figure *1-2* is a line, with the usual apparatus at the sub-station *A*. When the subscriber calls by taking down the receiver *R*, current flows from the battery *B* in its entirety through the line *1-2* and the line signal relay *9* to energize the latter, lighting the lamp *10*. In answering the operator inserts plug *M*, thereby automatically accomplishing two things—first, short-circuiting the relay *9* by closing the spring *4* and the sleeve *6* of the jack together on the sleeve of the plug; and second, connecting the supervisory relay *R* in the following circuit: battery-bus *340*, wire *34*, relay windings, wire *22*, cord conductor *23*, plug sleeve *21*, jack sleeve *6*, wire *30*, battery-bus *38*. This would cause a fall of potential across the terminals of the relay *R* from *34* toward *22*, and the consequent flow of current would tend to set the signal *12*; but it will be observed that the subscriber has his telephone off the hook, and therefore another circuit is also closed from the plug sleeve when in the jack, as follows: Spring *4*, line wire *2*, substation, line wire *1*, battery-bus *39*. This would cause a fall of potential across the terminals of the relay *R* in the reverse direction to the first, and as the division *41* of the battery has seventeen cells, while the division *40* has but three cells, the net or resultant

potential difference is twenty-eight volts, from *22* to *34*, in the cord circuits. This tends to swing the armature *36* to the right, where it is shown, and hence to leave the signal unlighted.

In making a call, it is obvious that since the substation circuit is still open, the first or smaller division *40* of the battery will produce a proper current flow to light the lamp *12* until the subscriber answers, when the same condition will be established as described for the calling subscriber, until the subscribers hang up, when the signals will again be displayed, the relays being then again exposed to the battery *40* only.

737,589, William M. Davis, electromagnet.

It has been said that nearly every available way to manipulate signals on common battery connections, with but two wires leading into each jack, has been covered by a certain group of inventive engineers, who have many applications



737,589—ELECTROMAGNET.

pending in the patent office. We do not vouch for the truth of the statement, by any means, but we do scrutinize each patent that comes out, with extra interest, when it looks like the present one. It embodies the principles of a two-wire multiple, although the claims are every one restricted to the form of relay shown in Figs. 2 and 3.

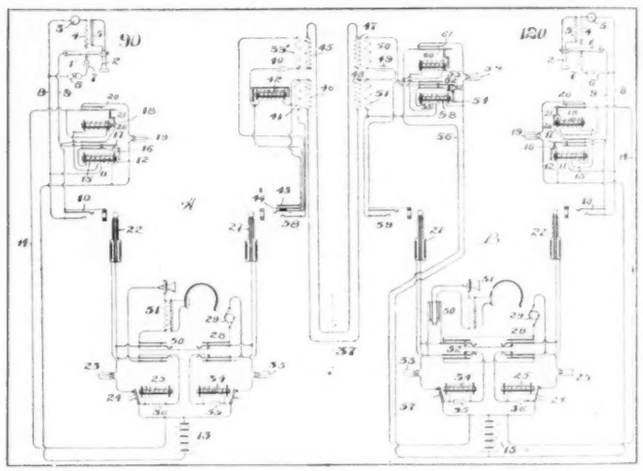
In the drawing, Figure 1 shows a subscriber's station, his line, and the jack, with co-operating parts, at central. *l* is the main battery, from which connections extend through the differential windings on the cut-off relay *K* to the line wires *b-b*. The jack *g* has its contacts connected to the line wires in open bridge or multiple. *m* is the line signal, and *h* is an answering plug, having a connection through the impedance coil *i* to the main battery.

Normally, when no plug is in the jack *g*, the relay *K* is inactive by reason of the balanced condition of its windings, current flowing through both when the subscriber calls. The line signal *m* is displayed by this current flow, however. When, in response to the call, the operator inserts plug *h*, a short circuit is closed around the winding K_2 and through the winding *K'*, by way of the long spring of the jack, the sleeve of the plug, and the impedance coil *i*. Coil *K'* thereupon gets more current than coil K_2, and the relay pulls down its armature *q*, which by means of the insulating rod *r* pushes down the spring *n*, and so breaks the circuit, not only of the coil K_2, but of the line signal *m*, cutting the latter off from the line during the connection.

Referring to Figs. 2 and 3, the armature *q* lies with one end on the core extension *p'*, kept in place by a raised ridge on the extension and a corresponding formed up notch in the armature, which is held down by spring *s*. Rod *r*, of insulating material, is fixed to the end of the armature, and has a lower screw end that plays in a slot in the end of the spring *n*, the latter normally lying up against the contact *o*. When the armature is drawn down the spring is forced down.

737,590, William M. Davis, telephone exchange system.

This is a trunking system for common battery exchanges. It has two objects: First, to permit the use of the trunks for instruction purposes, instead of using separate instruction circuits between the operators; and, second, to permit the use of repeating coils in the trunk circuits without short-circuiting the main batteries. It involves the application of



737,590—TELEPHONE EXCHANGE SYSTEM.

one of the standard Stromberg-Carlson line circuits to a trunk line for signaling forward, with a magneto drop annunciator for signaling back. The operation of this line circuit has been given in connection with patent number 737,589. It may be briefly capitulated thus: In the diagram herewith, a differential relay *12* as one of its windings *15* connected through the cut off springs *16-17* to line *9*, and on the other side to the line signal relay *18* and by wire *14* to battery. The other winding, *11*, is directly connected from line *8* to the battery *13*. When the subscriber *90* calls by taking down his receiver the resulting current flow produces no effect on the relay *12*, but energizes the relay *18* to close the contacts *20-21* and light the lamp *10*. When the answering plug *22* is inserted in the jack *10* a circuit is closed from the battery to the tip of the plug and thence by the short spring to the winding *11* and back to battery, giving that winding an over plus of current and energizing the relay, which raises the spring *17*, cutting off both the line relay *18* and the winding *15*, and connecting wire *9* directly to the long spring *10*. This condition prevails as long as the plug is in the jack.

According to the present arrangement the trunk line *37* is regarded as a subscriber's line extending out from the exchange *B* and having its subscriber's terminal in the shape of a jack at station *A*. Supposing a call to have been answered at station *A* by the insertion of the plug *22*, and sup-

pose the wanted subscriber to be number *120* at station *B*. Plug *27* is inserted in the jack *38*, by which means the cord circuit from *22* to *27* is connected directly to the trunk line *37*, and in fact the original subscriber's line *14* is also connected. At the *B* end of the trunk the relays *54* and *55* correspond in every respect to the line relays *12* and *18* above described. As soon as the plug *27* is inserted in the jack *38*, and the circuit is thereby closed (either back through the subscriber's station *90* or the operator's set) current will flow through the trunk from battery *13 b* the following path: *57, 58, 51, 48, 37, 46, 41, 38, 27, 30, 22*, out to station *90* and back to spring *10*, plug sleeve *22, 30, 25, 31, 27, 38* (long spring), *39', 45, 47, 50, 62, 52, 53, 55, 56*, and to battery. This produces no effect on relay *54*, but energizes relay *55* and so lights the lamp *59*. The plug *27* is inserted in the jack *39* in answer to this call, the same as it would be in answer to any other. Its insertion closes the following circuit: battery *13*, wire *57*, coil *58*, short spring *39*, plug tip, lamp *33*, and back to battery. As in the case of the line signal the relay *54* is energized by this increase of current in the coil *58*, and the spring *62* is lifted, cutting off the coil *53* and the signal relay *55*, this condition prevailing as long as the plug *27* is in the jack.

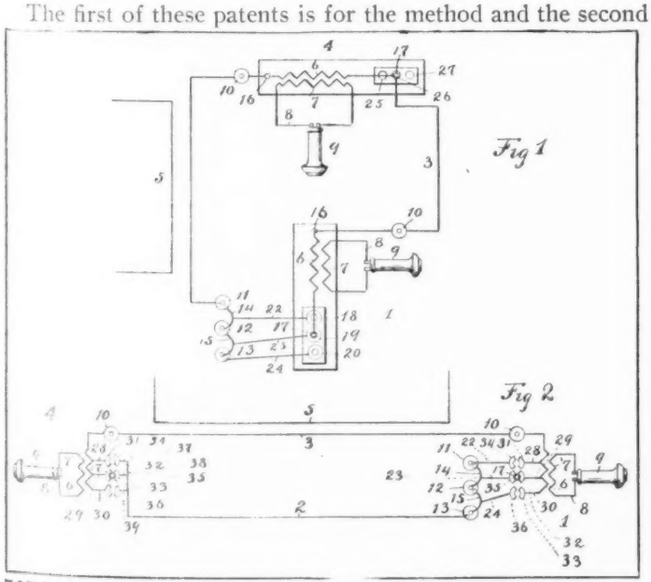
For signaling back, the drop annunciator *42* is bridged across at station *A*, so that the *B* operator can ring back over the trunk to call the *A* operator. When the plug *27* is inserted it short circuits this annunciator at the springs *43, 44*. Voice currents are propagated through the repeating coils *39', 41, 45, 46*, and *47, 48, 50, 51*; but these coils are prevented from furnishing short circuits for the batteries *13* by the inclusion of condensers *40* and *49*. We have thus two bridged coils with condensers in the bridges; and in ringing back from the *B* end a short circuit for generator current is prevented by the low capacity of condenser *49*, which therefore offers a high impedance to low frequency currents.

It will thus be observed that the same principles are applied both to the trunk and lines, and no separate instruction circuits are required.

737,710, William Condon and Albert Barrett, anti-induction method for telephone systems.

737,711, William Condon and Albert Barrett, anti-induction telephone system.

The first of these patents is for the method and the second



737,710—ANTI-INDUCTION METHOD FOR TELEPHONE SYSTEMS.

for the apparatus of the same invention. By the present practice in the patent office these cannot be claimed in the same application, hence the division, which, however, does not prevent their being covered by one description here, particularly since the same drawing appears in both patents.

This scheme contemplates avoiding inductive disturbances on telephone lines, due to outside influences, by cutting down the sensitiveness of the receivers until the noises are no longer apparent, and then compensating for the loss in receiver efficiency by cutting in more transmitter battery, to produce stronger transmitter effects.

In the drawings, Fig. 1, *1* and *4* are two stations, each having a transmitter *10* and receiver *9*, together with induction coil *6-7*, distinguished by this peculiarity, that the primary is made of spring wire so that it can be drawn out of the secondary and put in again, at will. *11-12-13* are the line batteries, and wires *22-23-24* lead to a plug board by which one, two, or three cells can be cut in, as desired.

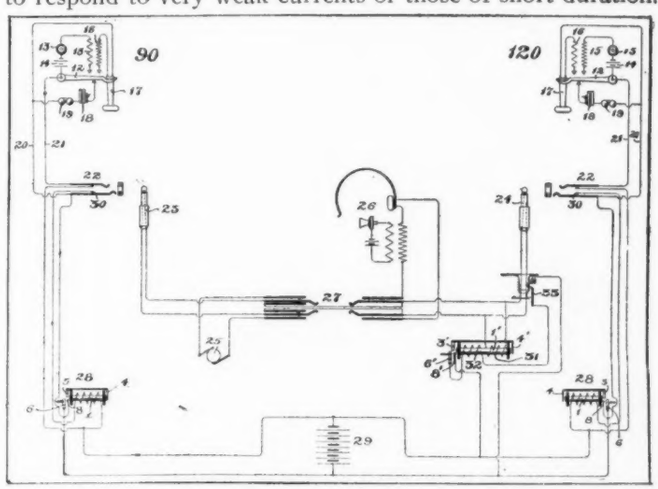
In operation, if the line is noisy, the primary is drawn out of the induction coil until nothing can be heard, and then more battery is cut in to give more powerful transmitter effects.

In Fig. 2, the plug board *34-35-36* serves to cut in the battery cells *11-12-13*, and simultaneously cut out sections of the primary winding *6* of the induction coil.

The result, in this invention, is exactly like that produced by plugging up one's ears to avoid unpleasant sounds, and asking others to shout the necessary and pleasant things.

737,715, William M. Davis, telephone exchange system.

The invention in this case is of a type of signal adapted to respond to very weak currents or those of short duration.



737,715— TELEPHONE EXCHAGE SYSTEM.

In many modern types of signal, a tip-up or other movable armature and signal structure is provided, whereby a considerable load is imposed upon the magnet, to be handled by current from the subscriber's station. In a system where magneto hand-generators are employed the working current at central is apt to be too weak and too uncertain to be depended upon for more than the briefest and simplest operation. In the present case the line signal and clearing-out magnets are provided with two armatures each, the working armature and a small additional armature controlling a battery circuit closed as a shunt of the line. The weak magneto current simply pulls up this little auxiliary armature, and the battery current then does the work of displaying the signal.

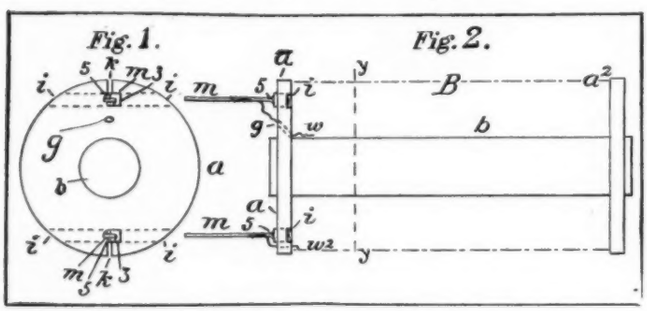
In the figure the line *20-21* passes from a subscriber's station *90* to the spring-jack *22* and thence to the annunciator *28*. This annunciator has a working armature *3* and a small auxiliary armature *6* included in circuit as follows: to the battery *29*, to the coil *1*, to the spring-jack contact *30*, to the long-spring, and thence down to the contact *8*. The first impulse of magneto current causes the closure of

this circuit, when the consequent flow the battery through the coil *1* will reinforce the magneto-current to pull up the armature *3*. When the plug *23* is inserted the long-spring is forced away from the contact *30*, and the battery circuit being broken the annunciator is restored.

The clearing out signal for the cord circuit *27* is indicated at *31-32*. In this case the magnet has two windings, one *31*, being connected across the cord circuit, and the other *32* connected to the battery *29* through the auxiliary armature *6'*, its contact *8'*, and a plug seat switch *33*. When the subscribers ring off the magneto current causes the attraction of armature *6'*, whereupon battery current will pull up the working armature. This condition will prevail until the plug *24* is pulled out of the jack and restored to its seat, thereby opening the battery circuit and de-energizing the magnet.

737,720—James Duncan, electromagnet.

This patent covers a form of terminal to be applied to the heads of magnet spools. The common practice is to insert pins into one of the magnet heads in a direction parallel to the core, holes being bored through the head and counterbored on the inside to receive the pins, with nuts in the counterbores and nuts upon the outside face. The ends of the windings are led through holes in the heads and soldered to the terminals. The principal objections to connections of this kind is that when the nuts become loose, as they will, the pins are liable to turn and break the wires. Loosening of the pins frequently happens in soldering.



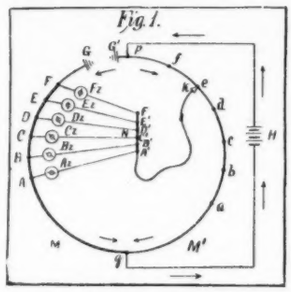
737,720—ELECTROMAGNET.

In the present case a flat strip *m* is employed, the end being bent over and back to form a T-shaped head *2*. The strip is then slipped into a slot *k* cut in the edge of the spool head, the head *2* lying in a transversed saw kerf *i*. With a pair of pliers set close down to the spool head the strip *m* is then given a quarter turn, as shown at *5*, thus preventing the strip being pushed in and binding down the end *3* of the head portion. The head cannot come out of the slot, on account of the saw kerf, and unless the strip is twisted it should remain tight indefinitely. The coil ends are brought and started in the usual way.

737,869—S. A. Reed, selective system.

This invention is based upon a system patented to Mr. Reed in December, 1901, No. 688,118, involving an adaptation of the principle of the Wheatstone bridge. In the former case the invention was applied to an intercommunicating system, and in the present case it is applied to a two-wire party line leading from a central station and working upon either common battery or magneto plan.

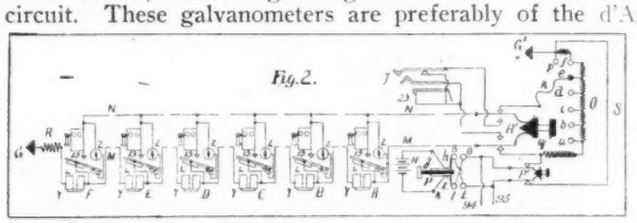
The general scheme is shown in Fig. 1. The battery *H* feeds current through both sides of the circle *M* and *M'* in the directions of the arrows. The branches *F F'*, *E E'*, etc., with the connection to the movable contact point *K* constitute the bridge, a portion of the side *M* at *GG'* being



grounded. Now, supposing the two sides of the circuit to have an appreciable resistance, it is apparent that by moving the point *K*, different positions will be found where there will be a balance of potentials across one of the branches and a drop on all the others, and for each branch there will be a corresponding point where that branch will be balanced and the others will not.

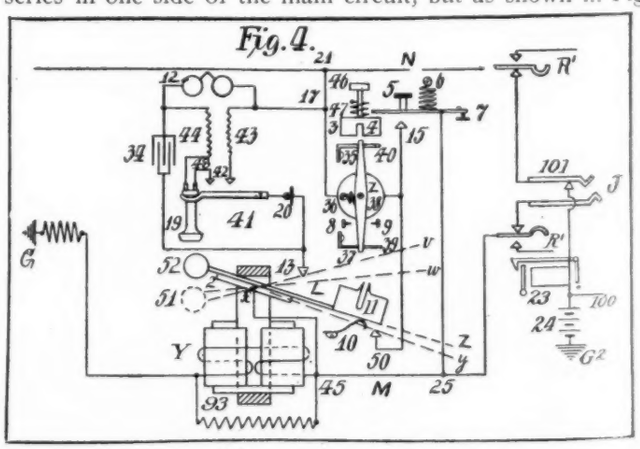
Turning to Fig. 2, the same arrangement is shown amplified and with telephones added to the galvanometers *Fz*, *Ez*, etc., in Fig. 1. The circle is here replaced by the metallic telephone circuit *M N*, normally connected at central to the springjack *J* and the signal magnet *23*. The key *R'* serves to disconnect the jack and magnet and put the line on the selector switchboard *O*, having a number of coils from *p* to *a*, with appropriate contacts and a co-operating plug *e*. This corresponds to the contact *K* in Fig. 1. *P* is a pole-changer, and *P'* is a switch, whereby the main battery *H* may be connected to line around the switch *O* to throw current upon the line in either direction at will.

The telephones at the six stations shown are normally disconnected, and are adapted to be connected by the polarized relays *Y*, whose armatures all stand normally in a position shown, connecting the galvanometers *Z* across the circuit. These galvanometers are preferably of the d'Ar-



737,869—SELECTIVE SYSTEM.

sonval type, controlling a swinging arm *38* as shown in Fig. 4, which is normally centered by a spring *36*. Figs. 5, 6 and *7* of the patent show the apparatus, which is carefully worked out, but its functions are well indicated in the diagrams herewith. In Fig. 4 the polarized magnet *Y* controls the talking circuit at contract *13*, the arrangement of the ringer, receiver, transmitter and coil being the standard bell common battery arrangement. The magnets *Y* are in series in one side of the main circuit, but as shown in Fig.



737,869—SELECTIVE SYSTEM.

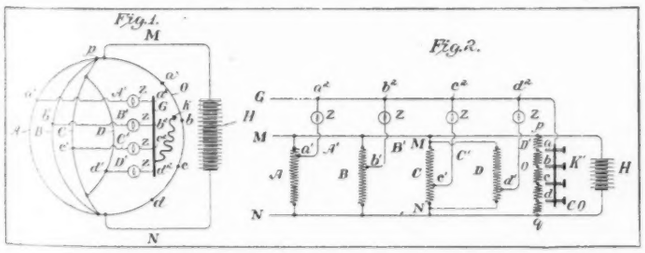
4, each one is shunted by non-inductive resistance. The galvanometers *Z* are the selective and locking devices of the system. Suppose the operator at central desires to call station *B*. The plug *e* is inserted in the socket *b* of the switch *O* and the key *R'* is depressed to connect the line to the switch. Switch *P'* is then depressed, and the supposed

changer is in the correct position current will flow out the line in the proper direction to press down all of the armatures *L* against the contact *50* (see Fig. 4) to connect the galvanometers *Z*. The grounds *G* and *G'*, corresponding to the same grounds in Fig. 1, cause the current flow to be distributed as in that figure. The resistance selected at switch *O* is just right to produce a balanced condition across the terminals of station *B*, but no balance in any of the other stations. This galvanometer, therefore, will not be deflected, but all the others will. In this condition of affairs, the operator snaps the pole-changed *P* on to the second pair of contacts, thereby reversing the current on the line, the action being very quick by reason of the employment of spring contacts *h* and *i*. This reversal causes all the armatures *L* to swing suddenly on their pivots, and so quickly that the levers *38* of the galvanometers have not sufficient time to return to zero before the armatures are completely over. At station *B* the lever *38* being straight across, its end passes into the slot in the head *11* of the armature lever (see Fig. 4). At all the other stations, the levers being more or less turned, the heads *11* are blocked and the armatures cannot turn far enough to reach the contact points *13* and connect the telephones to line. At station *B*, however, the armature connects the telephone and conversation may proceed.

737,870—S. A. Reed, selective system.

This invention embodies an improvement over that covered by letters patent No. 688,118, to Mr. Reed, above referred to. This improvement consists in locating the selective parts or apparatus in multiple relations to the main circuit, thus clearing the talking circuit of objectionable inductance and impedance. Fig. 1 herewith shows the general scheme; Fig. 2 shows a "polystation line" having three main conductors, one of which may be the ground; and Fig. 3 is a diagram of an exchange line of magneto type, with several stations thereon.

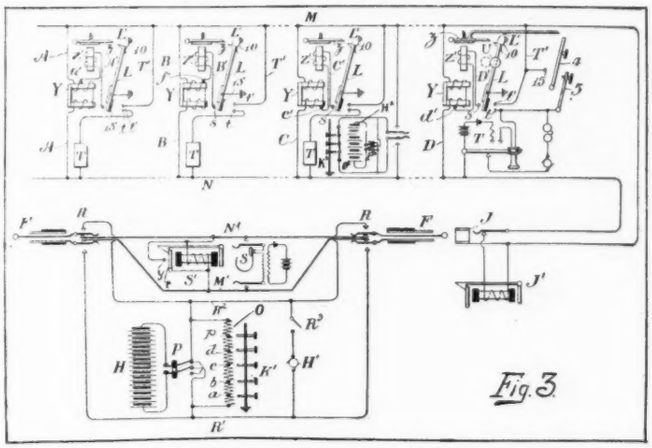
The general arrangement in Fig. 1, it will be observed, is substantially the same as that described in connection with the previous patent. The battery *H* supplies current to the two halves of the circular circuit, but in the present case multiple branches *A*, *B* and *C* are employed, each having its branch *A'*, *B'* and *C'*, containing a galvanometer; a fourth branch *D* and its connecting galvanometer being fed from branch *C*. By moving the point *K* to the points *a b c* and *d*, of different resistances, each will determine a balance for one branch *A B C* or *D*, while current will flow through the others to deflect the galvanometer needles. Obviously the



737,870—SELECTIVE SYSTEM.

number of branches may be increased indefinitely. Mr. Reed says that the shifting contact *K* may be fixed, and the same effect produced by cutting in and out resistance on opposite sides thereof. Or the contact *K* may be in the form of a conducting strip lying adjacent to the branch *O*, with a suitable key or keys to connect them at any desired point.

Turning now to Fig. 2, it will be noted that the same circuit is shown, but stretched out into a line *M N*, with the stations *A B C* and *D* on it, and controlled from the central office *C O*. Here again, a shifting contact may be employed, but there is shown a simple form of keyboard *K' b* by which the wire *G* may be connected to any one of the points *a b c* or *d*. It will be noted that the branches *a' b' c'* and *d'* are connected to different points of resistances between the sides of the circuit. In order that the greater part of the potential drop throughout the circuit may take place in these derived branches, the branches are made of high resistance as compared with the line, hence the connection of the branches at the points of progressively lower potential on the potential gradient from one pole of the battery to the other, so that the point of junction of each bridge is at a different potential from that of any other. The derived branch *O* at the central station also has high resistance compared with the line. The contact points *a b c* and *d* are so located along the branch that connection between *G* and



737,870—SELECTIVE SYSTEM.

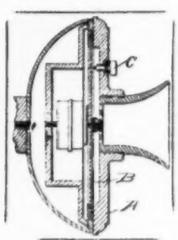
any one of them will cause the galvanometers in all the bridges to show a deflection, except the one which corresponds to the point connected to *G*.

Fig. 3 again shows the same principle of selection, but in this figure the party line is shown terminating in a line jack *J* and a signal *J'* at the central office, with a cord circuit and plug to effect connections in the usual manner. The bridged resistances in this case are the windings of the magnets *Y*, which are polarized and controlled grounded armatures *L*. Locking magnets *Z'* are connected from progressively advancing points *a'*, *f'*, *c'*, and *d'* on the magnet windings *Y* to contacts *s*, which when the polarized armatures *L* are thrown all the way over, are grounded. The operation is as follows: Suppose station *C* is to be called; the plug *F* is inserted in the jack *J*, cutting off the annunicator, and the key *R* is actuated to connect selective apparatus to the plug. The third button in switch *A'* is pressed down to close on contact *c*, when a balance of potential will be produced between the ground on key *K'* and the ground at station *C*, but not so at the other stations, where in every case the magnet *G'* will pull down its armature to lock the lever *L* against cutting in the telephone *T*. The desired station having been selected, the calling generator *H'* is used, after first reversing the pole-changed *P*, to lock out all but the station wanted.

In calling in keys *4* and *5* are employed, corresponding to those described in the former system. Key *4* locks the locking-armature, leaving the telephone free to be connected while the operator can reverse current to lock out all the other parties on the line; while key *5* closes both key *4* and the calling circuit to the magneto generator shown. The key *4* should be held down until after the operator has completed the connection. When the conversation is finished the operator first works the switch *R* and the pole-changer to send a reverse current through the line to unlock and to turn over all the armatures *L*; after which she may withdraw the plug *F*. The clearing-out signal *S'* short-circuits itself when the drop falls, so as to prevent any alternating

currents passing into one line or the other, where they might cause confusion.

Selective apparatus may obviously be placed at the different stations, as shown at station *C*, keys being provided to cut in. Subscribers can then call each other.

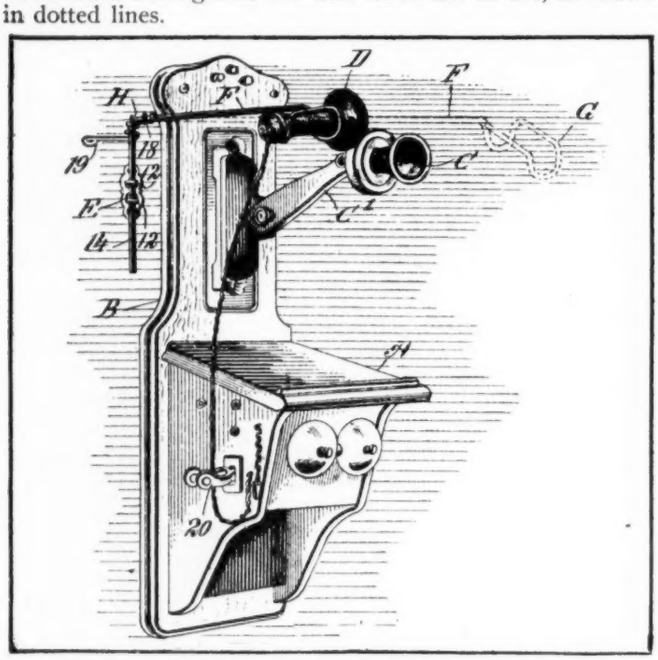


738,857—H. D. Stroud, telephone transmitter.

This is a solid back transmitter, having a push button *C* in its front plate, which when depressed presses on the diaphragm to produce a damper effect, preventing annoyance due to outside noises while using the telephone.

737,894—E. Bass, support for telephone receivers.

This is a pivoted receiver support comprising the bent arm *F*, having a vertical portion turning in a wall bracket *E*, and with a cradle at its outer end to hold the receiver. A coil spring *H* tends to throw the arm around across the back board and against the wall when not in use, as shown in dotted lines.



737,894—SUPPORT FOR TELEPHONE RECEIVERS.

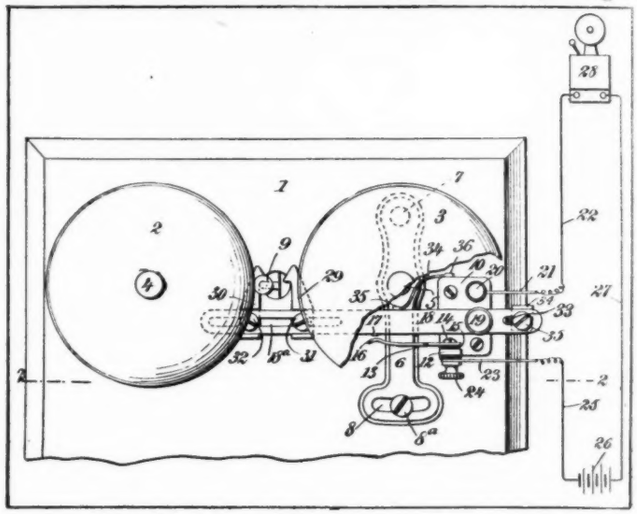
The receiver being always off the hook, Mr. Bass provides a plug or wedge, which is attached to the side of the desk by a little chain seen in the figure, and by means of which the hook switch can be held up or down as the case may require.

737,922—G. L. Gulliford, drop switch for telephones.

This is a little mechanical relay device intended to close a circuit and ring an extension bell whenever the telephone bell rings. It consists essentially of a lever *18*, pivoted at *19* to a plate *10* carrying a binding post *20*. On the other side of the plate a second post *24* is laterally supported and insulated, carrying a contact spring *13* that co-operates with a contact *17* on the lever arm. The plate *10* is secured to the bell box beneath one of the gongs, and the lever *18* is normally held up by one or the other of the adjustable hooks *29* and *30*, which are intended to take over the bell clapper rod *9*. Now, with the parts in the position shown, if a call comes in, the clapper rod moves, the lever *18* drops, the contact *16 17* is closed, and the circuit *22 25 26* of the auxiliary bell *28* is thereby closed to announce the call. To render the drop certain in its action, a spring *34* is secured to the plate *10* and presses the lever down.

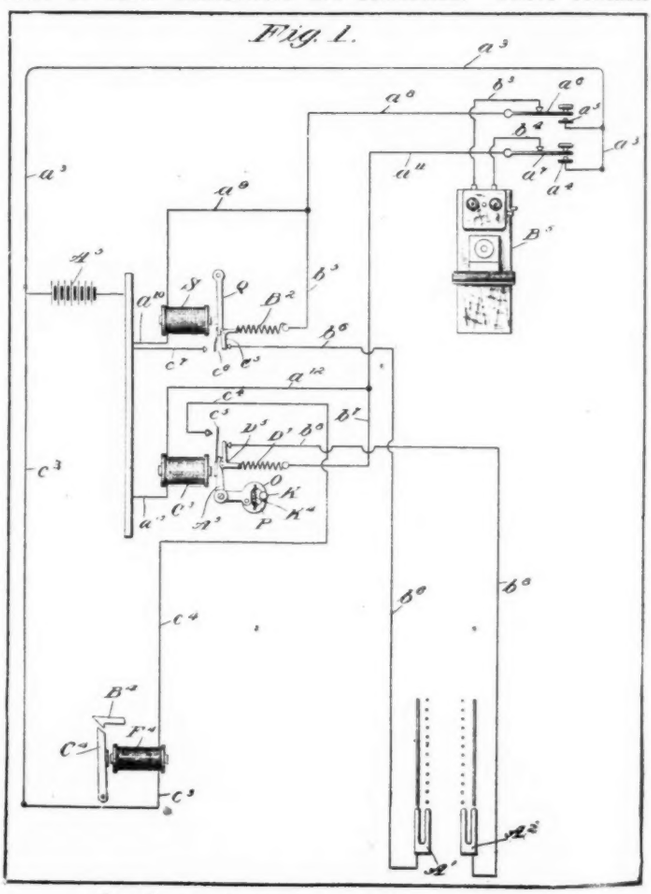
738,156—J. J. Brownrigg and J. K. Norstrom, automatic telephone apparatus.

This is an automatic exchange apparatus, the patent being assigned to the Globe Automatic Telephone Company of Chicago. Common battery is employed for signaling or



737,922—DROP SWITCH FOR TELEPHONES.

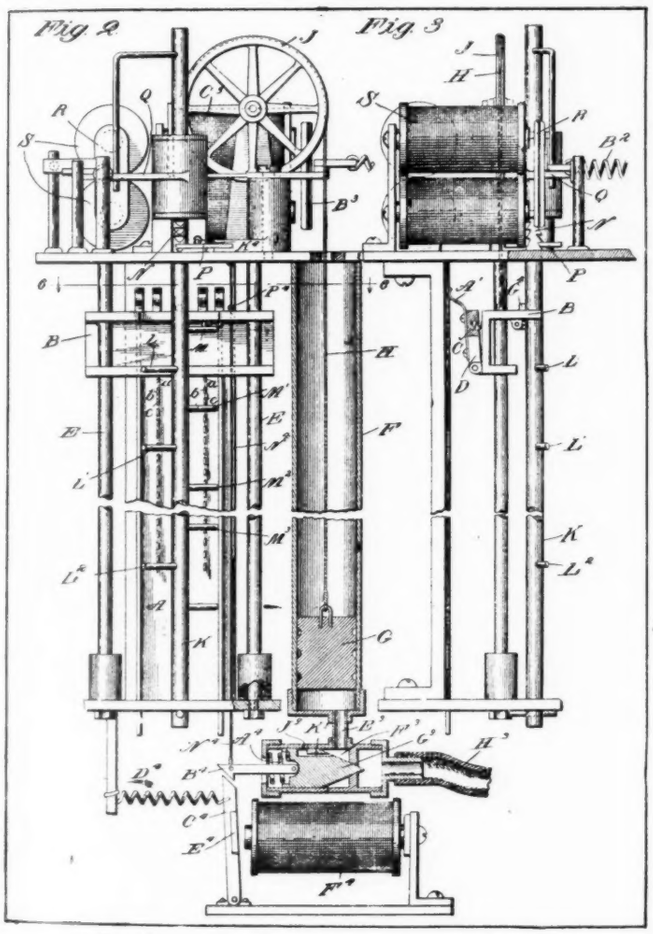
selecting, and local batteries are used for talking. Each subscriber is provided at the central office with a switch panel, having, say, one hundred pairs of terminals to which the lines of other subscribers are connected. These contacts



738,156—AUTOMATIC TELEPHONE APPARATUS.

are divided into groups of ten each, and a carrier is adapted to move up and down the face of the panel by long steps corresponding to the groups of ten and by short steps corresponding to the units of each group. Each of these move-

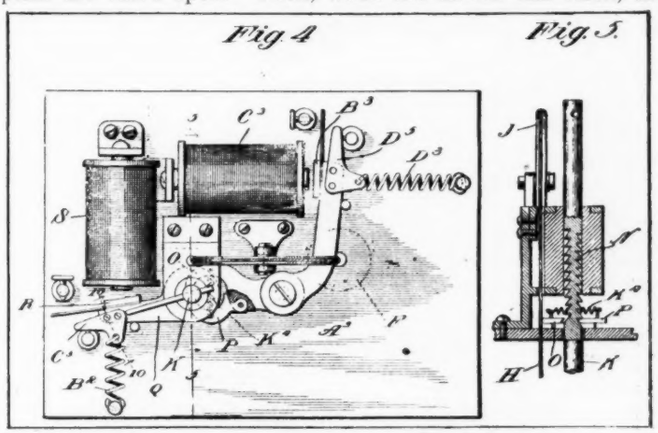
ments is controlled by a separate magnet, each magnet being connected to one side of the subscriber's line, which is metallic, the battery being connected to both sides of the line and to the subscriber's station by a ground or third conductor. Each side of the line is provided with a selector switch or key at the substation, and when either key is depressed the single magnet only is worked; but when both keys are depressed a third magnet is worked for restoring the switching parts at central. Figures 2, 3, and 4 are a front view, a side view, and a top plan respectively of a subscriber's central station switch. This consists of a frame carrying the panel *A*, on which are supported the various line contacts *a b c*, etc. A carrier *B* slides up and down on vertical rods *EE*, having upon its inner face a spring pressed plate *D* which carries the contact terminals *A'* of the local subscriber's line, so that by sliding these contacts over any



738,156—AUTOMATIC TELEPHONE APPARATUS.

pair on the panel he may connect his line to that pair and its line. The carrier is connected by means of a cord passing up over a pulley *J*, to a plunger *G*, sliding in a cylinder *F*. This plunger is not quite as heavy as the carrier *B*, so the latter normally tends to descend from its elevated position. In front of the carrier is a rod *K* having oppositely projecting fingers *L2*, *M2*, etc. This rod extends up through the top of the frame, and is there provided with a bent arm engaging with the armature lever *Q*, so that when the magnet *S* is energized and de-energized the rod is rocked one way and the other, so that first one finger and then an opposite finger will engage with the projecting part of the carrier *B*. The fingers are staggered so as to present step by step detents, and as the rod is rocked the carrier is permitted to drop for each complete movement the distance of two fingers, as by an escapement. This distance is so chosen as to cover ten terminals. Thus the subscriber can quickly drop his carrier to any particular group of terminals. In order to select a particular terminal of the group the entire rod *K*, with the carrier *B* is permitted to move down step by step through an escapement mechanism *O P* on top of the frame, engaging with teeth *N* in the rod. The escapement pawls are secured to an armature lever *A3* controlled by the magnet *C3*, while the rocking of the rod *K* is controlled by the armature lever *Q* of the magnet *S*. Suppose the number to be desired to be 65: the carrier is first dropped by rocking the rod *K* three complete times; and the rod and carrier are then set down five steps by energizing the magnet *C3* that many times.

To restore the parts to normal after such an excursion, an exhaust connection to the cylinder *F* is provided, the pipe *H3* leading to an air pump. Between this pipe and the cylinder there is a valve casing *F3*, with a valve *V3*, having an open port *J3*. This valve is normally closed, with the port *J3* open to permit the plunger *G* to rise freely. The valve has a stem *B4* connected to a cord *N4*, which runs up through the frame and through a hole in the carrier, so that when the carrier gets to the uppermost position it will lift the valve-stem. The valve is worked by an armature *C4* of the magnet *F4*, on the back stroke; that is, the magnet pulls up and the armature latches under the hook on the valve-stem so that when the magnet lets go the spring *D4* pulls the valve open. Then, when the carrier has risen, as



738,156—AUTOMATIC TELEPHONE APPARATUS.

stated, it lifts the hook *B4* away from the armature lever, and the spring *A4* immediately closes the valve.

The circuits for this apparatus are shown in Fig. 1. The subscriber's telephone *B5* has two keys, *a6* and *a7*, the first of which closes the circuit of magnet *S* through one side of line, *a8* and back by the common return *a3* to the central battery. The other key closes the circuit of the magnet *C3* by way of the line wire all to the common return or ground *a3* and battery. The functions of these two magnets has been explained.

To work the magnet *F4* and thereby restore all the mechanism, both keys are simultaneously closed. The effect of this is to pull up both armatures *Q* and *A3* of the magnets *S* and *C3*, whereby a circuit is closed from magnet *F4* through wire *c4*, contact *c5*, through the frame of the machine to the armature *Q* and the contact *c6*, thence to the battery and back to the magnet. Upon releasing either one of the keys, or both of them, the apparatus will all be restored, as previously described.

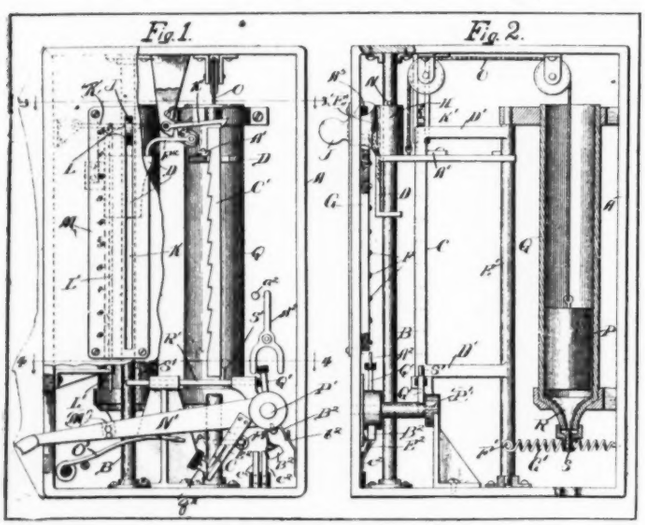
738,157—J. J. Brownrigg and K. K. Norstrum, calling mechanism for automatic telephone systems.

There are four patents in this series to Brownrigg & Norstrum which are all more or less related. In the preceding one a central office switching mechanism was described, and in the present case the principal part of the invention resides in the subscriber's apparatus for sending impulses to operate

the central office apparatus. One form of central office switch is also set forth, being shown in Fig. 6. The characteristic features of this apparatus are shown in Figs. 1, 2 and 3, and comprise two slides with springs passing over series of contact points, one slide being released by the switch hook in rising and the other at the termination of the movement of the first. The switch hook controls contact, which upon finally hanging up the receiver complete circuits that restore the central office apparatus automatically. In these figures *A* is a frame for box containing a pair of vertical guides *B*, upon which the two separate carriers *D* slide up and down. Each carrier has a cord *O* passing up over sheaves and down to counter balance weights *P* moving in dash-pots *Q*, each dash-pot having an adjustable valve *S* at the lower end to regulate the emission of air and suitably retard the movement of the weight *P*. Above each carrier, on the guide *B*, is a loose sleeve *H* having a handle *J* extending out through a slot *K* in the front of the box and carrying a pointer *L* co-operating with a scale *L'*. Inside and parallel with the slots are insulated contacts *F*, all connected, over which passes a spring *E* on the carrier. Each carrier has an opening, through which projects a vertical rack *C'* carried by arms *D'D'*, rigidly secured to a vertical post *E'*, each post having a side pin *F'*, to which is secured a spring *G'* tending to turn the post and throw the rack to the right in Figs. 1 and 3, so as to disengage the teeth from a spring pawl *A'* on the carrier. The two racks are normally held to the left in position to engage the spring pawls by means of hooks *K'*. The hook on the left has a long vertical rod *L'*, shown in dotted lines in Fig. 1, extending down to a point just above the switch hook. The right hand hook *K'* has a release lever *F2* pivoted beneath it and extending to a point where it will be raised by the left-hand carrier *D* when in its uppermost position.

The switch hook *M'* controls contact *A2*, *a2*, *f2*, *g2*, *E2* and *e2*, *e2*, *B2*, also a pair at *B2*, *b2*. The arm *Q'* on the hook when the latter is depressed pushes over a slide *R'* to return the rack to the left ready for another operation.

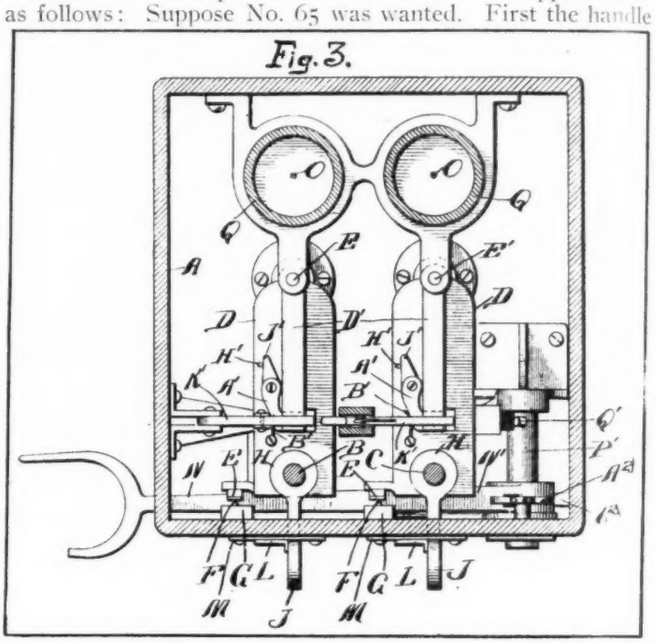
In the central office arrangement shown in Fig. 7 the same



738,157—CALLING MECHANISM FOR AUTOMATIC TELEPHONE SYSTEMS.

general principles are involved as in the preceding patent. Magnet *C3* steps the bar *H2* along to put the set of contacts on its extremity into engagement with any particular tens group on the switchboard *P2*. Magnet *G3* steps around the arm *J3* to select a particular unit of the group at some contact *O2*. These magnets are operated separately by the impulses sent by the two carriers *D*, but when both are energized the circuit of a third magnet *O4* is closed at *R4* and *Q4*, the magnet *O4* then pulling down the retaining pawl *E4* of the slide bar *H2*, whose spring *J2* immediately pulls it to right, cutting off the magnet *G3* and by means of pin *N4* holding down the detent *J4* to permit the spiral spring *K4* to return the arm *J3* to zero. The connections are such, as will be found by tracing the circuits from battery *A3*, that the left-hand slide *F* will energize magnet *C3*, the right-hand slide will work the magnet *G3*, both separately, and when the switch hook is finally depressed by hanging up the circuit of both magnets will be closed to work the magnet *O4*.

The method of operation of the subscriber's apparatus is as follows: Suppose No. 65 was wanted. First the handle



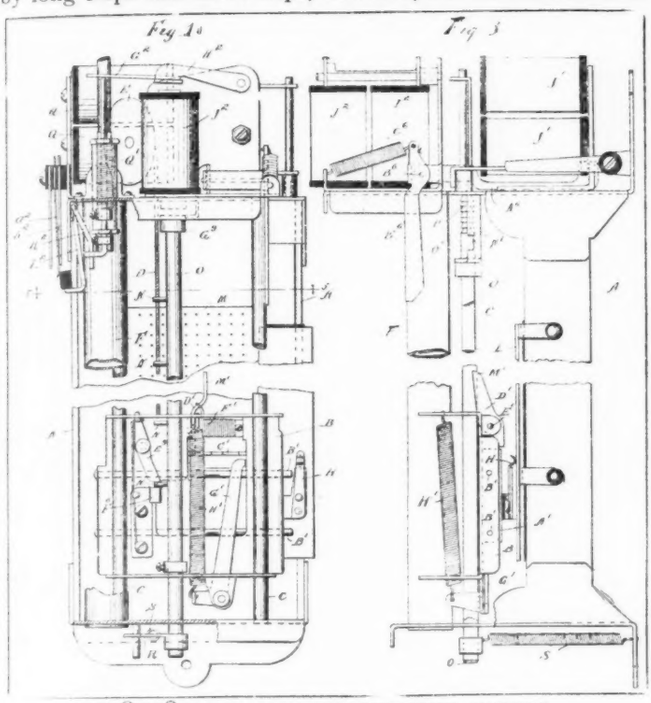
738,157—CALLING MECHANISM FOR AUTOMATIC TELEPHONE SYSTEMS.

J on the left is pushed down until the pointer reaches the numeral 6; then the handle on the right is pushed down until its pointer reaches numeral 5; then the receiver is taken off the hook and the latter in rising closes the circuit *A2*, *a2* and pushes up the rod *L'*, releasing the left-hand carriage, whose weight *C* raises it, its spring *E* passing over the contacts *F* and sending six pulsations to line *e*, *f*, stepping the bar *H2* six groups to the left. At the end of its travel the carrier *D* raises the hook *K'*, the rack *C'* swings to the right, and the right-hand carrier rises, sending five impulses over the line wire *i* through the contacts *Q3*, *F3* and the magnet *G3*, stepping the arm *J3* around to 5. The subscriber then rings up by means of his hand generator *R2*. A local battery *C4* is employed for talking, with the transmitter *B4*, the receiver *W2* and the induction coil *L3*.

738,158—J. J. Brownrigg and J. K. Norstrum, automatic telephone system.

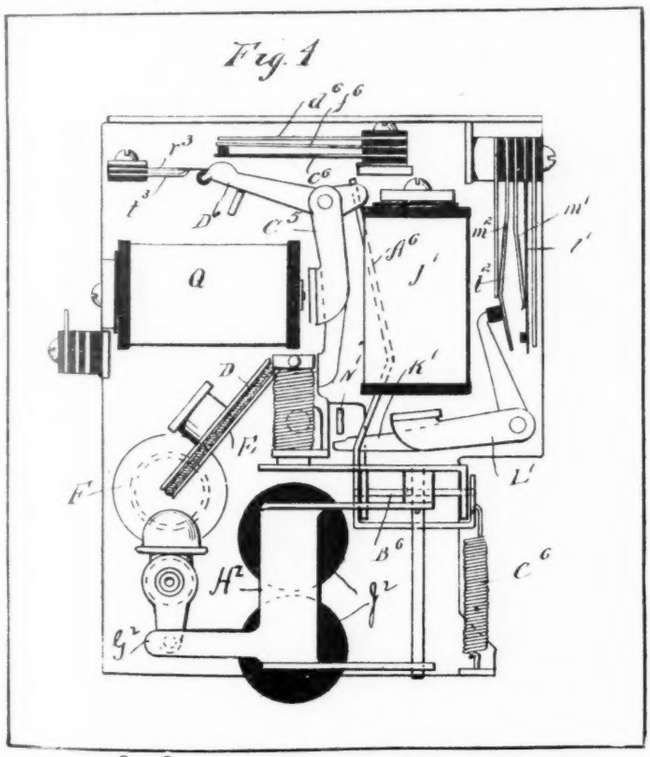
The invention in this case is an alleged improvement over that in the first one of this series of patents (738,156). It consists of a central office switch having a carrier with contact springs moved over a terminal board to connect the springs to the contacts of any other desired line. Each subscriber has an outfit of this kind at central. Of this outfit Fig. 1 is a front view, Fig. 3 is a side view and Fig. 4 is a top plan, while Fig. 7 is a diagram of the central office circuits. The frame *A* carries the vertical guide rod *C*, upon which slides the main carrier *B* supported by a cord *D* passing up over sheaves *E* and down to a plunger or piston in a tube *F*. The carrier descends of its own weight and is lifted by air or liquid admitted to the piston tube through a valve controlled by a pair of magnets *J2* in Fig. 4. A rocking rod *O* with escapement pins *N* permits the carrier to fall through long-step, and the entire rod structure with the

carrier is stepped down through short-step by means of ratchet teeth *P*, all as in the patent previously referred to. In the present case the contacts are not only stepped down by long steps and short steps, however, but on the carrier *B*



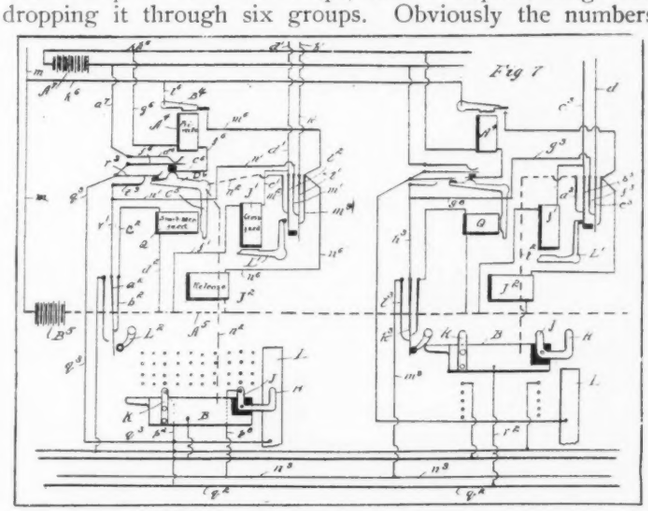
738,158—AUTOMATIC TELEPHONE SYSTEM.

is mounted an auxiliary carrier *A'* having a crosspiece on the transverse rod *B'*. By an ingenious arrangement of mechanism and circuits one magnet *J'* controls both the cross feed of the auxiliary carrier and the long vertical feed. In Fig.



738,158—AUTOMATIC TELEPHONE SYSTEM.

3 will be observed a lever *M'*, which is fixed to the rocking rod *O* and has a notch *O'*. Normally the entire carrier *B* is at the upper end of the frame and the auxiliary carrier is held over to the right in Fig. 1 by a spring. In Fig. 7 the subscriber's metallic circuit is shown coming into the central station at *b' k'*. By means of the transmitting apparatus described in the previous patent impulses are first sent over the line wire *d'* to affect the magnet *J'*, whose armature *L'* moves the upper end of the pawl lever *M'* (see Fig. 3), and through a ratchet controlled thereby permits the auxiliary carrier to feed across whatever number of steps is required. This does not rock the rod *O*, because at such time the end of the lever *M'* is opposite the notch *O'* in the lever *N'*, in Fig. 3. The cross feed having thus been effected to bring the springs (shown at *K* and *J* in Fig. 7) over the desired vertical rows of contacts on the switchboard panel *M*, the subscriber sends another set of impulses over the second line wire *k'*, which reach and affect the short step feed magnet *Q*, whose armature lever *C5* works the escapement engaging the teeth *P* (see Fig. 3) and steps down the carrier and the main rod *O* the number of steps required in a group. The subscriber then sends a third set of impulses over the first line wire *d'* to again affect the magnet *J'*, whose armature impinges on the lever *N'* (Figs. 3 and 4) to rock the rod *O* and drop the carrier *B* the required number of long steps to reach the desired group. Suppose the required number of the contacts on panel *M* is 165. The above operation would step the cross feed over to the first row, and the short feed would step it down five steps, the subsequent long feed dropping it through six groups. Obviously the numbers



738,158—AUTOMATIC TELEPHONE SYSTEM.

may be subdivided in any other way, the main point being that wide latitude of movements is secured in three operations. These operations are all performed by means of energy derived from the common battery *B5* at central, which has the common return or ground wire *m* leading to all the subscribers' stations.

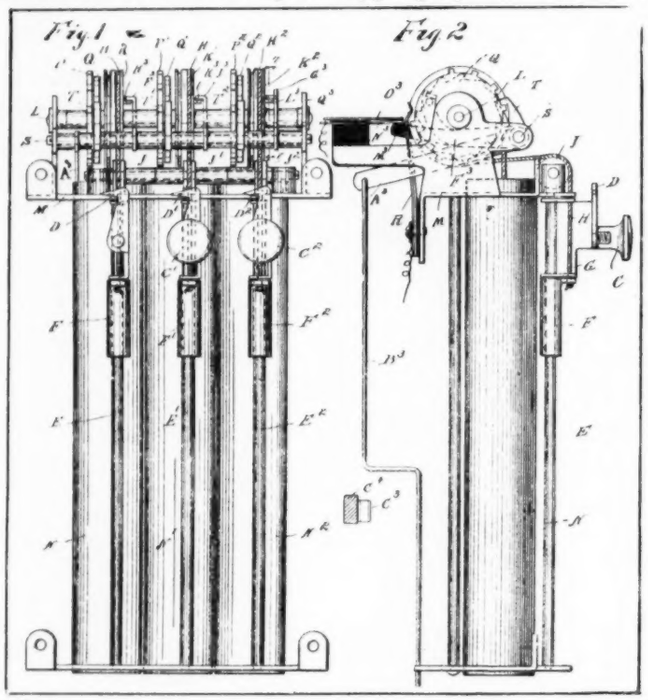
To give a busy signal it is provided that when the desired connection has been made a second battery *A7* will find circuit to the wanted line through the magnet *A4* and a rather complicated circuit starting with the springs *d6, f6, c6* and the frame of the machine. If the line wanted is not busy its ringer, of high resistance, will be in circuit and the current flow from battery *A7* will be too weak to energize the magnet *A4*. On the other hand, if the wanted subscriber has his telephone off the hook a low resistance path will be closed through his talking set, and current from battery *A7* will pass there through in sufficient quantity to energize magnet *A4*, whose armature closes a circuit from the main battery *B5* through wire *m, k6, l6, B4, m6, n6* and the release magnet *J2* back to battery. The release magnet opens the pressure valve in the tube *F* and restores all the apparatus, thereby preventing interference. Apparently the absence of response constitutes a busy signal.

Calling when circuit is complete is by a hand generator,

and local batteries are used for talking. At the end of a conversation when both subscribers hang up the circuits are closed by the switch hook in such manner as to work the switches shown at central to energize the release magnet *J2*.

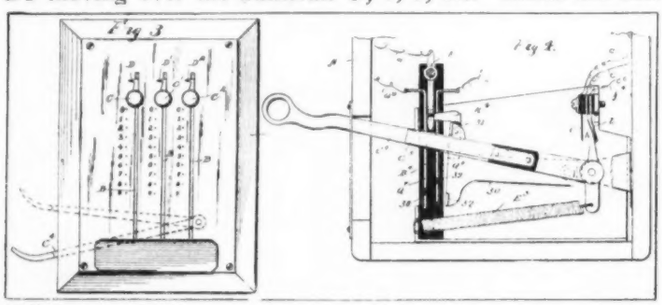
738,159—J. J. Brownrigg and J. K. Norstrum, calling mechanism for automatic telephone systems.

This is a subscriber's calling apparatus for use with the central office switches of patents 738,158, just noticed. The



738,159—CALLING MECHANISM FOR AUTOMATIC TELEPHONE SYSTEMS.

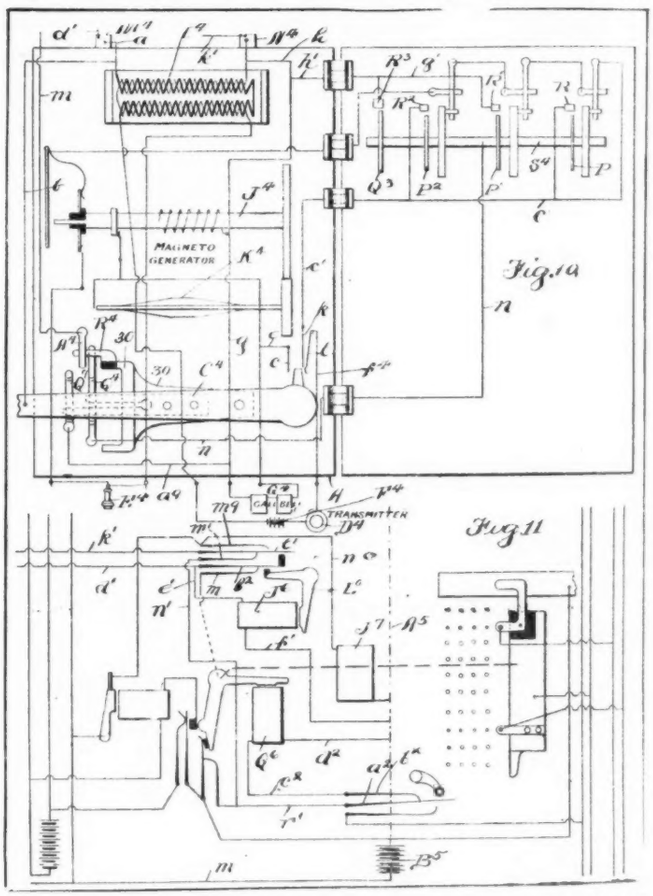
apparatus is contained in a box, the front of which is shown in Fig. 3, Fig. 1 being a front view and Fig. 2 a side view of the mechanism removed. In Fig. 3 the face plate of the box has three vertical slots *B*, in which slide the three handles *C*, *C'* and *C2*, having corresponding pointers *D*, *D'* and *D2* moving over the numerals *O*, *1*, *2*, etc. Inside the box



738,159—CALLING MECHANISM FOR AUTOMATIC TELEPHONE SYSTEMS.

are three vertical guide rods *E*, *E'* and *E2*, upon which the handle frames *D* slide, being normally held up as shown by the sleeve *F*, *F'* and *F2* secured to cord passing up over the sheaves *J* and around the pulleys *H*, *H'* and *H2* and down into the dash-pots *N*, *N'* and *N2*, wherein they are secured to weights fitted to act as pistons and permitted to rise quickly but descend slowly by inwardly opening check-valves at the lower end of the dash-pots. Mounted on the spindle *L*, and connected with the pulleys *H*, *H'* and *H2*, are the toothed wheels *P*, *P'* and *P2*, having corresponding detent pinions *Q*, *Q'* and *Q2*, each engaged by a stop pawl *T*, *T'* or *T2*. These stop pawls are mounted on a second spindle *S* and hold the wheels wherever they are set when their respective handles *C*, etc., are pulled down. The first pawl has a long arm with a drop rod *B3* coming down to within reach of the switch hook; the second pawl has an arm *F3* adapted to be tripped by a pin *H3* on the first pulley; the third pawl has an arm *J3* tripped by a pin *K3* on the second pulley; and the third pulley has a pin *L3* engaging an arm *G3*, which works an insulated circuit-closing arm *M3*, shown in Fig. 2.

Without going into the circuits, the operation may be briefly stated as follows: The three handles are pulled down until the pointers are opposite the required numbers, say 165. The receiver is then taken down and the switch hook rises, pushing up the rod *B3* and releasing the first pawl, permitting the wheel *P* to be turned back to zero by the falling of its weight. When the wheel and pulley *H* reach zero



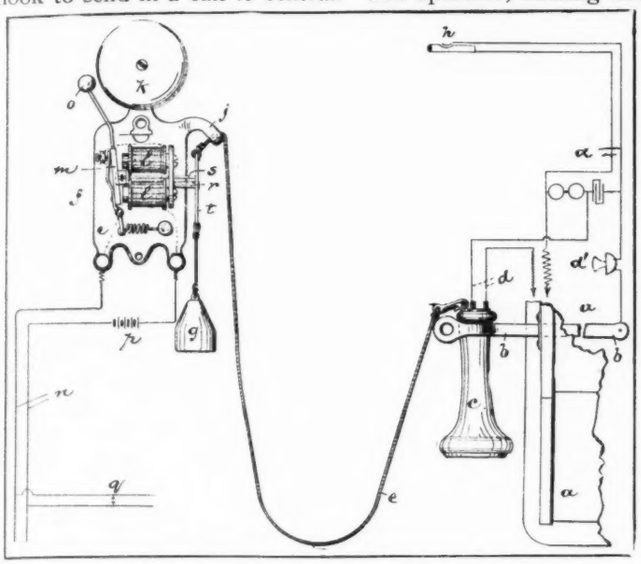
738,159—CALLING MECHANISM FOR AUTOMATIC TELEPHONE SYSTEMS.

the pin *H3* trips the pawl of the second wheel to send its signal, and the second wheel in turn trips the third wheel, which in turn at the conclusion of its movement closes the circuit and cuts out the signaling mechanism. Taken in connection with the preceding patent, these three wheels will be understood to send the three sets of impulses therein referred to. The switching mechanism shown in Fig. 4 and the circuits in Figs. 10 and 11 illustrate the connections at the subscriber's station and the central office respectively in accordance with the description in the preceding patent referred to.

738,351—J. D. Peachey, telephone alarm system.

This invention relates to improvement in another system represented in a prior application referred to. It comprises a thermostatic alarm circuit *q* containing an alarm bell *f*, whose magnet armature *m* controls a push rod *s*, which on

energization of the magnet disengages a link *t* from a rest pin *r*, permitting a weight *g* to drop, and through the agency of a cord *e* pulling the receiver *c* of a telephone set off the hook to send in a call to central. The operator, hearing the

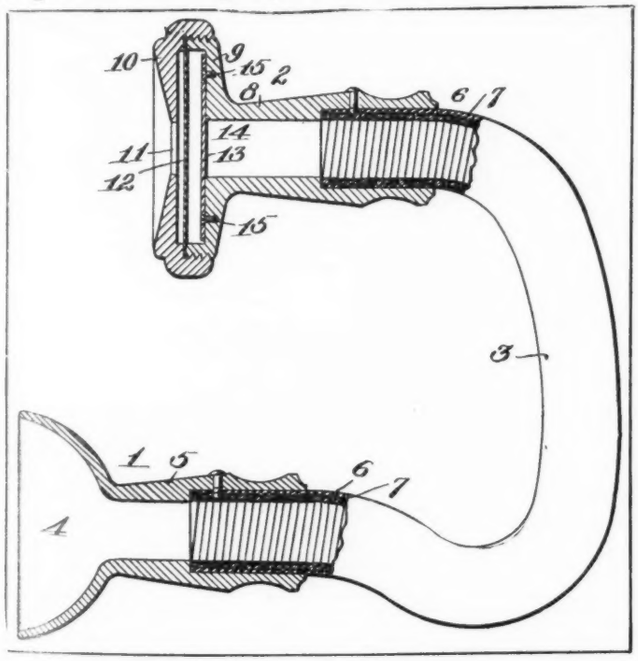


738,351—TELEPHONE ALARM SYSTEM.

sound of the bell through the telephone, will know that a burglar has broken in or a fire has broken out.

738,593—L. M. Atkinson, auriphone.

This is a species of ear trumpet composed of a tube *3*, with a mouthpiece *4* to speak into, and an earpiece *11* covering a thin iron diaphragm *12*, behind which is located a

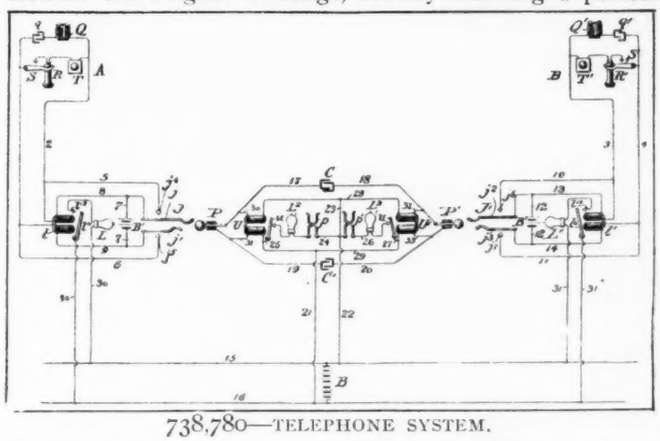


738,593—AURIPHONE.

bar magnet *13*. It is claimed that vibrations communicated through the tube to the bar magnet will strengthen and reinforce the vibrations of the diaphragm.

738,780—S. A. Duvall, telephone system.

This is a common battery telephone system having the usual subscriber's apparatus at stations *A* and *B*. At the central office *C* is the line relay, through which connection is made to the calling battery *B'*. When a plug *P* or *P'* is inserted in a jack, shunt branches around the magnet windings are closed in the jack at the contact *j4* and *j5* through the wires *5* and *6*, which are connected to the line outside of the relay. In the cord circuit supervisory relays *U* and *U'* are bridged across the two paths of the circuit, separated by the condensers *C C'*. The battery connections are made between the magnet windings, thereby attaining a perfect

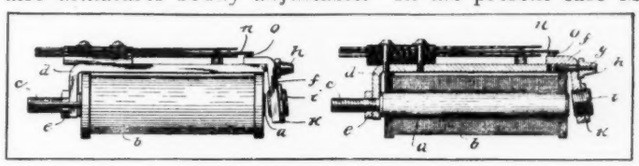


738,780—TELEPHONE SYSTEM.

balance, as will be noted also in the case of the line relays. Talking current is supplied from the battery *B*, and in order to keep the lamps *L2, L3* normally dark, plug seat switches *p* and *p'* are included in the lamp circuit, open when the plugs are idle.

738,801—C. M. Hedman, electro-magnet.

The adjustment of the air gap between the core end and the armature of an electro-magnet has received considerable attention of late. Adjustable cores are well known, as are also armatures bodily adjustable. In the present case Mr.

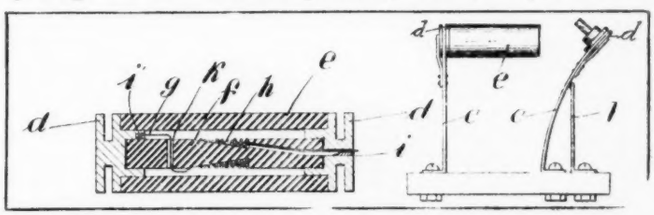


738,801—ELECTROMAGNET.

Hedman makes a portion of his armature adjustable to and from the core. The armature is shown at *f*, and a screw *i* is inserted therein, which may be adjusted to determine the air gap desired and is held in adjustment by the lock-nut *k*. The type of relay shown is familiar in connection with common battery work.

738,803—G. E. Hoglund, thermal cut-out or circuit changer.

This is a sneak-current arrestor of a familiar type. It comprises a stem or core *f* of rubber or gutta-percha turned down to have a thin portion in the middle, around which the heat coil *h* is wound. The ends of this coil are secured in openings in the metal end plates *d, d* at *i, i'* by means of



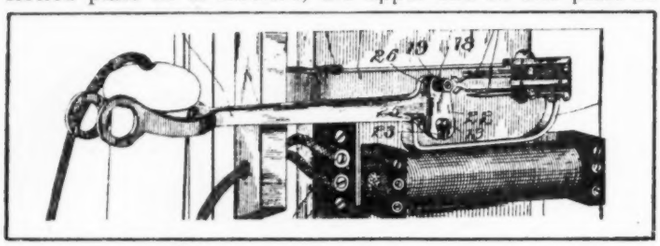
738,803—THERMAL CUT-OUT OR CIRCUIT CHANGER.

wedges or metal plugs, which make good contact but permit the wire and plug to separate when desired. An excessive current heats the central stem at its weakest portion, so that it weakens and parts, as shown in the right hand figure, under the pressure of the spring *c*. The device is

inclosed in an insulating tube *e*. This patent, as well as the preceding one, has been assigned to the Stromberg-Carlson Telephone Company.

738,813—W. Kaisling, telephone apparatus.

This is an improvement in details of one of the Stromberg-Carlson switch hooks. The hook is mounted on a pivot pin *13*, which has a slot into which the forked or slotted plate *22* is inserted, the upper end of this plate *22*

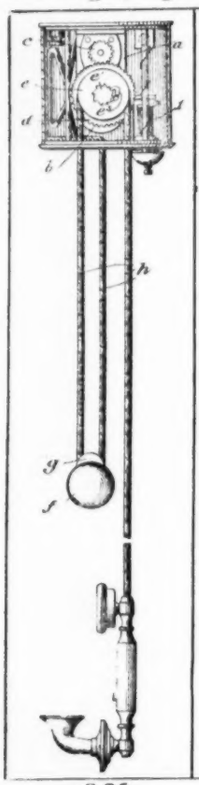


738,813—TELEPHONE APPARATUS.

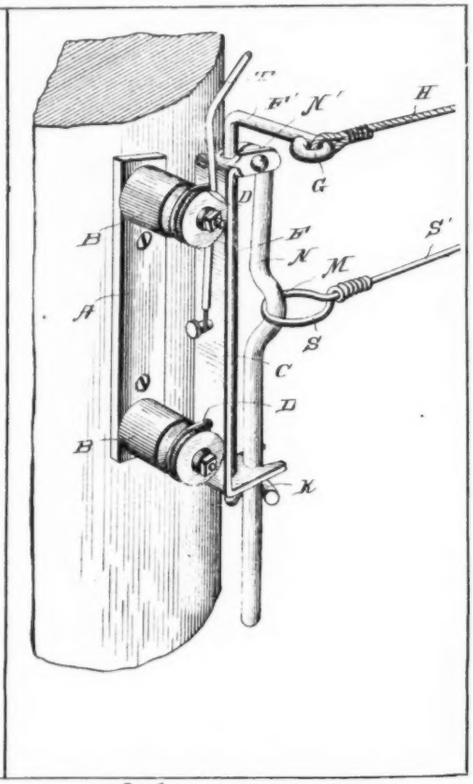
being also slotted or drilled to receive the clamping screw *26*, which also carries the sleeve of insulation *18*, which cooperates with the contact springs *20* in the operation of the hook. Accidental displacement or loosening of the hook is rendered almost impossible.

738,861—M. I. Vought, telephone.

This is a suspended combination telephone set, the conducting wires of which are contained in a cable *h*, which passes up over a pulley *e*, having a ratchet connection with the driving gear *d* of the call generator *b*. The generator and ringer, together with the line terminals, are in the box



738,861



738,969—ELECTRIC SWITCH.

overhead. A counterweight *f* is provided for the telephone, and by lifting the latter no effect is produced, while by pulling it down a call is sent. The usual switch is contained in the handle of the combination set.

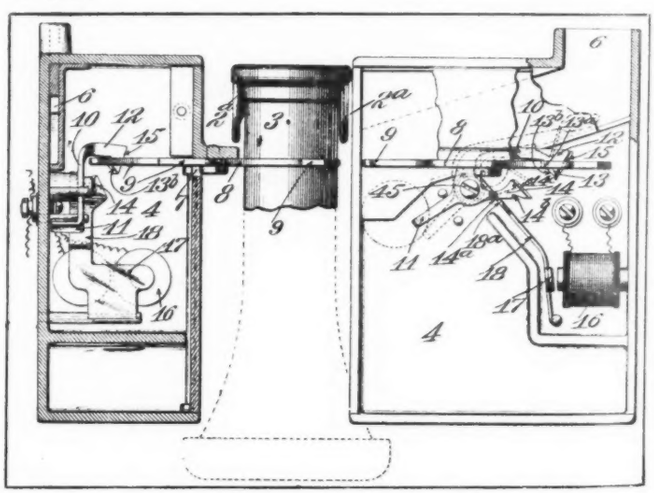
738,969—B. W. Waldridge, electric switch.

We have recently had occasion to pay our respects to two inventors who have successfully solved the problem of how to disconnect a telephone from the line on the pole without telling us how to re-establish the connection. There seems to be an epidemic among inventors of some strange disease which produces this sort of an excrescence upon their output. The present device comes from Trenton, Missouri, and consists of a pivoted bar *N*, to which the telephone wire *S'* is connected, and which is normally held in the position shown by the hook *K* on the lower end of a vertical rod pivoted in the same support *C* that carries the bar *N*. The line wire *P* is connected to this support, and the entire apparatus is wired to a pair of insulators *BB* secured on the pole. The upper end of the hook rod has an arm *F'* with a terminal eye *G*, to which a cord is secured at *H*, which passes to the windows or any other place where it is handy to pull when storm clouds are seen looming up in the offing. A slight pull on the cord turns the hook *K* and the strain on the wire *S'* pulls out the bar *N* and breaks the connection.

We would suggest that the next inventor would kindly produce some automatic means whereby the second pulling of the cord will restore the connection that our fertile friends have been so anxious to break.

739,075—R. W. Goeb, locking mechanism.

A number of patents have recently been issued to the Comptroller Company of America of St. Louis for coin-controlled receiver locks. This and the following patent relate to similar mechanisms and are also assigned to the same company.

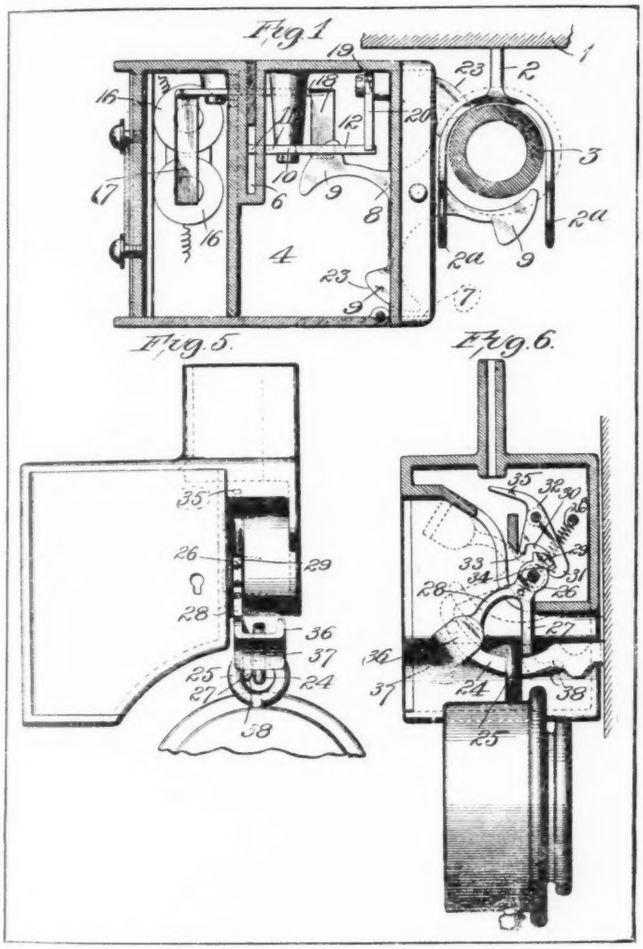


739,075—LOCKING MECHANISM.

In the present case a box *4* has a coin slot *6*, the coins being adjusted to fall upon an arm *11* of the locking escapement *10*, pivoted at *45* and having a tooth *12* normally in position to engage with one or the other of the arms of a pivoted spider *8*, some one of these arms always resting in front of the telephone receiver *3* when the latter is on its hook. The specific invention in the present case consists in the addition of a magnet *16* within the box, connected to be energized from a distance so as to release the locking mechanism to permit authorized persons to use the telephone without depositing a coin. The armature lever *18* of the magnet, when pulled up, presses up the arm *14* of the locking escapement, thereby lifting the tooth *12* clear of the rotating spider plate *8;* and as the end *18a* of the lever *18* passes into a notch *14*, the spider remains unlocked until the telephone has been replaced, when by reason of the cam faces *13b* and *15* on the tooth *12* the latter is lifted sufficiently to release the lever *18*, permitting all parts to resume their normal position, as shown.

739,114—W. H. Scott, telephone lock.

This is another locking device, employing a spider plate *8*, whose arms engage the receiver *3* to prevent its removal from the hook *2* until the coin has been deposited in the slot *6*. Such coin falling upon the end of the lever *11*, pivoted at *10*, lifts the locking end *12* clear of the spider arm *9* and unlocks the device. The same effects may be produced through the agency of a magnet *16* acting on an armature *17* to lift a finger *18* and unlock it. The magnet may be in a local circuit with a push button accessible to authorized



739,114—TELEPHONE LOCK.

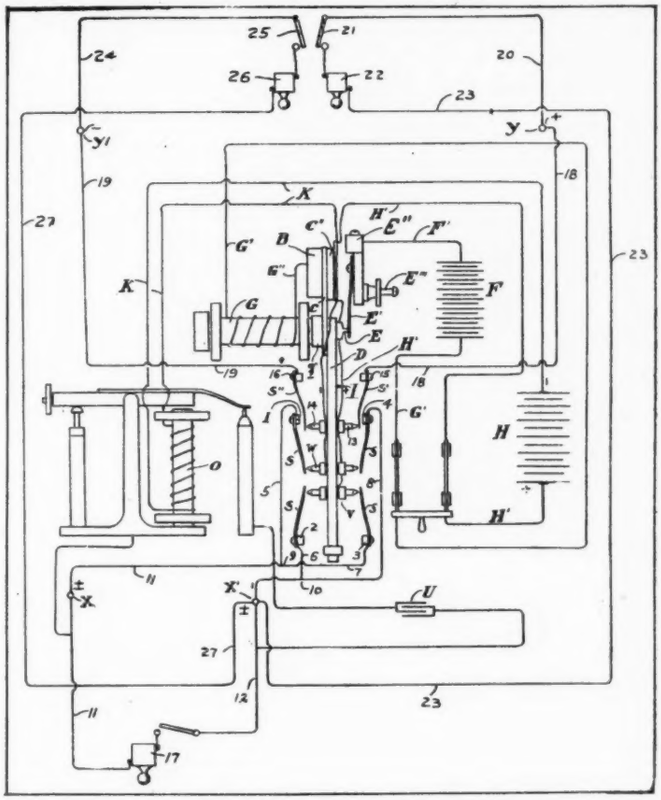
parties. Figs. 5 and 6 show a modified form of receiver having an eye *25* passing over a finger *24* and locked in place by a pivoted detent *28*, whose upper end engages with the locking escapement *31*, having a tail piece *35* extending under the coin slot.

739,128—T. W. Warner, pole changer.

This is the well-known Warner pole changer, in its latest improved form, adapted to give either alternating ringing currents or pulsating current of positive or negative direction. The line terminals are shown at *X*, *X'* for alternating current, and *Y*, *Y'* for positive and negative pulsating currents. *G* is the vibrator magnet included in the local circuit with battery *F* and the circuit breaker *E* on the vibrating arm *D*. The arm is of insulation and carries contacts extending through from side to side, which co-operate with the springs *SS* and *S'S2* to connect the battery *H* first in one direction and then in the other as the magnet *G* vibrates the structure, in a well-understood manner. The relay *O* is included in the circuit of the battery *H* and itself closes the circuit of the condenser *U* when ringing.

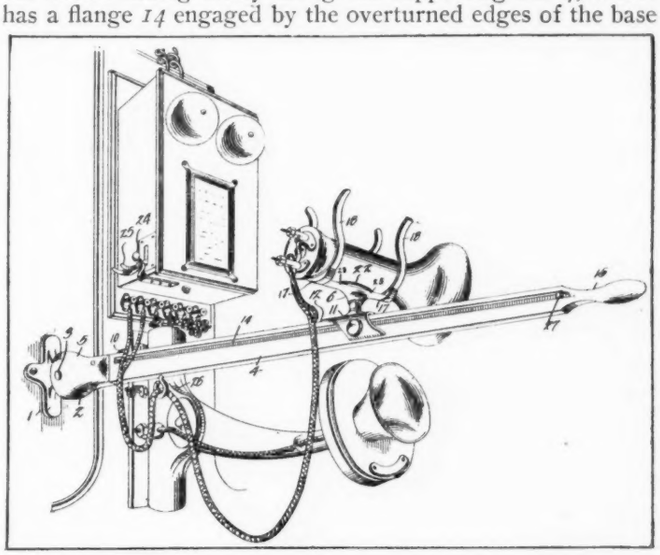
739,202—E. J. Murphy, adjustable bracket for telephones.

This device hardly needs description. It consists essentially of a cradle *22*, having arms *18* to support the receiver,



739,128—POLE CHANGER.

the cradle sliding freely along the supporting bar *4*, which has a flange *14* engaged by the overturned edges of the base



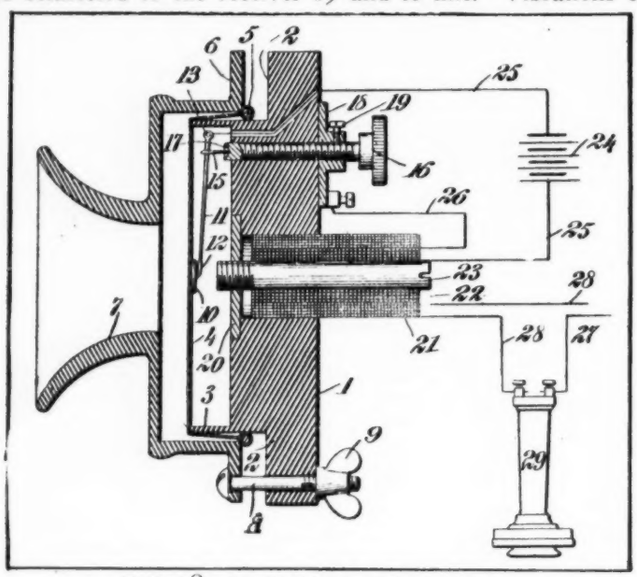
739,202—ADJUSTABLE BRACKET FOR TELEPHONES.

of the cradle. The bar *4* is pivoted to a wall bracket at *3*, and in order to control the switch hook *25* without hanging up the receiver a hook *24* is provided.

739,208—D. O'Brien, telephone transmitter.

This is a sort of perpetual motion transmitter. The diaphragm *4* carries an iron plate *10*, against which rests the tip *12* of a non-magnetic lever *11*, pivoted at *13* and fulcrumed upon a short needle *15* of steel. These parts are all heated and cooled in air for the purpose of providing them with a superficial layer of oxide, whereby they will have im-

perfect contact with each other. An induction coil with adjustable core *23* is mounted behind the diaphragm and a local battery circuit *27, 25, 26* is connected through the primary to the needle contact *15, 11*. The secondary *27, 28* is connected to the receiver *29* and to line. Vibrations of



739,208—TELEPHONE TRANSMITTER.

the diaphragm produce changes in resistance and thereby affect the magnetism of the core *23*, which in turn reacts upon the diaphragm. The inventor says that this produces greatly increased amplification of current changes.

NORTHEASTERN IOWA CONVENTION.

The annual convention of the Northwestern Iowa Independent Telephone Association convened in the rooms of the Commercial Club at Cedar Rapids, Iowa, September 25. Members of the association from all parts of the jurisdiction of the association, which embraces the northeastern section of the state, were present. President Vic Stevens of Dubuque called the meeting to order, and after a few remarks introduced Secretary Sessions of the Commercial Club, who welcomed the visitors to Cedar Rapids. He spoke as follows:

"Gentlemen: This being a general call all over a 'common line,' I trust that all 'receivers' are down to catch what is doing over the 'wires.' If I am permitted to generate sufficient 'central energy,' it is my purpose to give you some reasons why we are glad that you are in Cedar Rapids. I trust that I may not burn out a 'fuse,' run into a 'rosin connection,' find the 'resistance' too high nor get my wires 'grounded.' When I promised the 'head guy' to give a glad 'hello' on this occasion, I had no idea of any 'cross talk' from that 'storage battery' of information, D. E. Voris. Should I make any errors in handling technical terms, I shall expect him to 'pull slack' out of them and 'tie in' all loose ends. I have great fear that I may run out on a 'dead end,' fail to reach the 'circle top,' be troubled with 'induction,' get a touch of 'electrolysis,' or be troubled with 'carbon arresters,' which latter I understand to be more vigilant than the ordinary policeman.

"Gentlemen, we are glad to welcome you to Cedar Rapids and to the Commercial club rooms. It is a pleasure to have with us a body of men who have no troubles, absolutely none; We have enough of our own, but that is not here nor there. We are glad to welcome a fine body of enterprising men, who in the past few years have established a new business with its foundations firmly planted in the earth and its superstructure rising high in the air; in fact, aside from the balloon business, yours is on about the highest plane of any, and while much of it is 'up in the air,' the managers seem to be solid and substantial and of sufficient dynamic force to warrant a belief in the future soundness of the business.

"Gentlemen, your enterprise has made talk cheap. It has been held that he who makes two blades of grass to grow where but one was wont to appear is a public benefactor. If that be true, of how much more value to the world, gentlemen, are you, who have made words, which are said to be silver, so much more plentiful than they once were. It is true that someone has said that 'silence is golden'—I venture that the man who said this was thinking of his wife's talk just after she had beaten him in an argument as usual, surely no telephone manager of a toll line ever subscribed to any such a statement.

"Gentlemen, your energy and enterprise have made ears to hear, as the telescope has made eyes to see. You have brought the men of Podunk into neighborly relationship with the metropolitan; you have made it possible for the housewife to order a pound of codfish and a dozen clothes pins without waste of shoe leather or trying the patience of her husband. Surely husbands who once had commissions to buy pins, bread, meat, stove polish, and what not, should rise up and call you blessed. You have made it possible for a man to call up his friend at a distance and inquire the time of day, or buy a farm; you have made it possible to live in the country and yet be in touch with the town. You have robbed the country of that great terror, lonesomeness. You have given husbands relief by affording wives 'long distance' vocal exercise. I cannot now call to mind any body of men who have done more to make life worth while, to save shoe leather, to save time and to enable mankind generally to cultivate the high virtue of patience than have you.

"It is true that the public sometimes forgets the difficulties under which you labor, the new problems you have to solve, and sometimes slams the receiver into the hook with an oath or says unkind things to the girl at the office end of the line. It is true that sometimes 'phones get out of order at most exasperatingly inopportune times, that sometimes the telephone girl shows that she is only human by her carelessness, but anyone who cares to study the progress of telephony must admit that the service is constantly improving, and that compared with any other public service, as gas, water, heat, electric light, telegraph, railroad or the postal service even, it occupies a rank of completeness and sufficiency equal to any of them and superior to most of them.

"You, gentlemen, have not only had to create a new business under untried circumstances, but you have had to educate the public to an intelligent understanding of how to use the business opportunities you have afforded it. How well you have done this is shown in the fact that hardly a telephone line of standard equipment has been installed in this whole country before the demands upon it were so great that the plant has had to be doubled, trebled, or quadrupled even. All this has tried your executive ability and the patience of the public at the same time because of the necessary interruptions to the regular business of the lines. Under these circumstances the people sometimes have been unreasonably critical and cantankerous. Usually you have been patient under criticism and finally have made your service worthy.

"These, gentlemen, are, in brief, some of the reasons why we are glad to welcome you to Cedar Rapids. It is not possible in the limited time at your disposal to listen to any extended amplification of the value of your business to the country. You know these things better than any one can tell them. It goes without saying that men who put their energy and capital into the telephone business are performing service the public demands and is ready to compensate.

"Gentlemen, we welcome you to Cedar Rapids. We trust that your deliberations may be successful, that your plans for constantly improving your service may carry. We believe that you are public benefactors, that your business is legitimate, valuable, and that in the main your service is all you are paid for. When we stop to consider the fact that your business is still in its infancy, that you have met and solved great problems, and surmounted great obstacles, we can but stand amazed.

"When we consider all these things we are ashamed that we ever grumbled because at one time we had to wait the fraction of a minute for service.

"When we compare the service now with that of just a few years ago we can but accord to you words of praise for your efforts to serve the public.

"Gentlemen, I have occupied more of your time than I had expected to at the beginning and I have not said that which I would like to have said, but I trust that you will accept my effort in the spirit in which it has been made. If so, you will understand that you are truly welcomed to our city."

Hon. D. E. Voris of Marion responded to the address of welcome as follows:

"Mr. Secretary—It affords me pleasure for, and on behalf of the gentlemen of the Northeastern Iowa Telephone association, to respond to the words of welcome so warmly given by the worthy secretary of the Commercial club, spoken by him for the club and for the city of Cedar Rapids.

"This is a progressive age in which we live. The progress made along the lines of scientific development during the last half century has been wonderful, and during the last quarter of a century, simply phenomenal. At no period in the history of the world has time and space been so completely annihilated as at the present.

"Since the time that Laplace in 1832 suggested the idea of signaling by means of breaks in electrical currents, the scientists of the world have been actively at work in the attempt to make the idea of Laplace practical. Schilling, the Russian, and Gauss and Weber of Germany have left the imprint of their efforts on the

field of electrical development. Steinhall took up the thought in advance of the scientists of his day, of using but a single wire and making the earth act as a return current, and succeeded. Wheatstone of England in 1839 opened the first telegraph line in the world for public business or use, and that was but twenty miles in length; 1839 is not very far back in history of the past, but when we take a sweep of the world to-day and see the multiplied thousands of miles of wires, alive with electric energy, and see the continents of the globe, and the distant isles of the seas in momentary communication with each other, we appreciate in a measure the advance made during this period.

"Then came the heroic struggle of Prof. Samuel B. Morse. How intensely interesting is the story of his life to the commercial world, from the time of his invention of the electromagnetic telegraph in 1832, to the completion of his line between Washington and Baltimore in 1844, when, from the electric energy confined in a single cell in a rough wooden box coated inside with bees wax, there was ticked off from the crude instrument that first message, 'What hath God wrought?' The world stood amazed! That first message over an electric wire is as new and fresh to-day as then, only, owing to the achievements of the age, the great strides that have been made, the world has ceased to be amazed at anything. Ocean cables tie continents together, and the islands of the seas lie in their loops, and so vast are our possibilities, when the steel trust raised the price of wire, a Marconi gathers the air and sunlight together and flashes his message across the great Atlantic. Truly, 'What hath God wrought?'

"But the telegraph alone is not that in which we are peculiarly interested, but we are interested in that other secret which science has given up within the memory of nearly every gentleman present, and that is not only the transmitting of thought by the use of the electric current in dots and dashes in the clatter of noises from which only the trained ear of an expert can catch the thought conveyed, but, gentlemen, we deal with the human voice itself. By the developments made in your days and mine we bring our patrons face to face, as it were, and although hundreds, yes thousands of miles lie between them, we instantly annihilated the space, and the human voice speaks into the human ear. The commercial world is to-day transacting the bulk of its vast volume of business in audible tones through the desk 'phone, and Chicago is only in the next room to New York City, and soon the resident of San Francisco will be calling over the crest of the Rockies and Alleghenies, to the resident of Boston, asking the morning price of baked beans at the Hub.

"The rapid development in the practical use of the telephone has caused many changes in the plans of telephone companies, in fact we cannot keep up with the changes made absolutely necessary by new conditions from day to day, and for that reason has it become necessary for us to come together and discuss these conditions and the methods to be employed in their fair and proper adjustment, with due regard for the lawful rights of all others.

"From a mere glance at the program that the committee has prepared, one readily sees that some grave questions confront us, requiring the united wisdom of telephone companies and telephone men to adjust in a proper manner without at the same time precipitating fierce rivalries and bitter warfare among competing companies and conflicting interests. We are glad that it is ours to meet together in a lively commercial center, breathe the air vitalized by the push and energy of an active, aggressive and busy city, among commercial and business friends, where we can thoughtfully and fairly, and with the interests of all in view, weigh these great interests, derive wisdom and strength from the experience of each other, become even more closely united in a social as well as in a business way, and go to our various homes and offices the better prepared and enabled to please our patrons, and at the same time in an honest way, and for value received, be able to add to the account on the proper side of the office ledger."

The address of President Stevens of Dubuque was one of the interesting things on the program. He reviewed the work of the association and the prospects of the telephone business in this territory and throughout the state.

The program follows:

Address of welcome, F. J. Sessions, secretary Commercial Club.

Response, Hon. D. E. Voris, Marion.

President's address, Vic. H. Stevens, Dubuque.

The Future Outlook, R. L. Parker, Gladbrook.

The Present Telephone Situation, Dr. C. F. Bennett, Waterloo.

Some Past Experiences, Fred Bishop, Central City.

The Farmer Subscriber—Is He Profitable? H. F. Camp, Anamosa.

Good Toll Lines, general discussion.

"Where Are We At?" E. Duke Naven, LaPorte City.

Heart to Heart Talks, by the members.

W. D. Crist has accepted the position of manager for the Fremont Telephone Company, Fremont, Nebraska.

Charles L. Burlingham and wife of Chicago have recently returned from an extended pleasure trip on the great lakes.

A. K. Stevens, formerly of Chicago, has accepted the superintendency of Fairmont Telephone Company, Fairmont, Minn.

F. B. Cook has recently made an extended trip through the western country, spending some time on the Pacific coast and in Colorado.

L. H. Stoddard has accepted the position of superintendent with the Montana and Wyoming Telephone Company at Billings, Montana.

Ernest E. Yaxley and wife of Chicago recently returned from a two weeks' trip through Colorado, Spending most of the time in the mountains.

F. D. Cleaver has resigned from the management of Boone County Telephone Company at Boone, Iowa. It is said F. H. Jones of Iowa City will succeed him.

F. B. Cook and wife of Chicago recently returned from an extended pleasure trip throughout the Western country, taking in Colorado points and spending some time at points along the Pacific coast.

T. D. Davis has resigned his position as manager of the Cedar Valley Telephone Company's exchange at Dysart, Iowa. The resignation is to take effect as soon as his successor has been appointed.

L. D. Richardson has been appointed general superintendent of the Twin City Telephone Company's system at Minneapolis. Mr. Richardson was formerly manager of the Wisconsin Telephone Company's La Crosse exchange.

S. H. Bailey of McKeesport, Pa., general superintendent of the Federal Telephone Company, has resigned his position to take effect Oct. 15, 1903. Mr. Bailey will engage in the general electric business with headquarters in McKeesport.

M. E. Taylor has resigned the position of manager of the Galion (Ohio) Telephone Company to accept a similar position with the United States Telephone Company. Mr. Taylor will have charge of twenty-two exchanges. M. A. Charlton succeeds to Mr. Taylor's former position.

Julius Rumpel, of Weston, Mo., was a recent Chicago visitor. Mr. Rumpel reports great activity among the Independents in Missouri. In his section most of the new work is building farmers' lines. Mr. Rumpel owns the Weston Telephone System, as well as the lines radiating from Weston.

E. R. Harding, Western manager of the Holtzer-Cabot Electric Company, was a recent visitor to Boston. While there he went cod fishing and landed an eighty-pound cod. While this weight is pretty fair for cod, Mr. Harding states the big one got away from him after a struggle which nearly capsized the boat.

H. C. Hackney of Delevan, owner of the Walworth County Telephone Company, with exchanges in Delevan and Elkhorn, and the State Long Distance Telephone Company, spent a few days in Chicago the latter part of September. Mr. Hackney is one of the pioneers in Independent work and is widely known in telephone circles.

The Kansas City Telephone Rate Case.

MAYOR JAMES A. REED.

Kansas City, in 1888, took advantage of the power granted by the constitution of Missouri of 1875 to frame a so-called "home rule," or "freeholders" charter for its government, as to local municipal affairs. In this charter the city reserved the right to itself to regulate and control the matter of telephone, gas, electric light rates, etc. In 1879, the legislature of the state, by general enactment, provided for the incorporation of telephone companies, and the act stipulates that the rates to be charged by such companies must be "reasonable." The constitution of the state of Missouri (1875) also provides that no charter of a corporation should ever be so construed as to impair in any way the full and complete exercise by the state of the police power.

In 1887, the state transmitted to Kansas City, by enactments, its sovereign rights to exercise within the limits of the city, the police power of the state. In 1882, according to R. J. Ingraham, city counsellor, the Missouri and Kansas Telephone Company (a Bell concern) was incorporated in Missouri, with a capitalization of one million dollars, which has since been increased to an authorized capital of five million dollars, with three million one hundred thousand dollars of stock actually issued; a majority of this one million dollars of capitalization was given to the "parent Bell concern" for alleged privileges. And since then, and to the present time, the "parent concern" has managed in one way or another to hold a majority of the capital stock issued. The shares of stock so given to the Bell concern were paid up, or made good during the subsequent years, after the organization of the company, by diverting the earnings of the company for that purpose. During these years the local company has been compelled to pay to the "parent company" in the way of rentals and royalties over three million dollars.

September 8th, 1902, Kansas City passed an ordinance fixing telephone rates within the city at $60 per year for business telephones, and $36 per year for residence telephones. This ordinance, of course, applied only to points within the limits of the city. The rates charged by the Bell company at the time were $96 for business telephones, within a radius of a mile from the central station, and $72 for residence telephones within the same radius, with the usual increase for distances beyond.

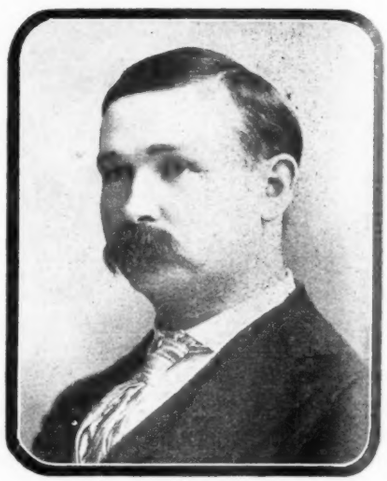
Backed by a strong public sentiment, evidenced by petitions from almost all of the civic organizations of the city, the city's legal department, after arranging the necessary preliminary steps, procured from the supreme court of the state of Missouri (in a direct proceeding, thus avoiding the delay of litigation through the lower courts) an alternative writ of mandamus, which commanded the company to either obey the ordinance in question or show cause why it should not do so.

The company filed its return to this writ, setting up among other things:

First: That the city had no power to pass or enforce this ordinance, or any such an ordinance.

Second: That the question of interstate commerce was so involved in the matter that the city and the state was without the necessary power to legislate on the subject matter.

Third: That the rate was confiscatory, and unreasonable, in that it would not yield a fair return on the capital of the company invested in the plant.



COUNSELLOR, R. J. INGRAHAM.

The supreme court of the state appointed Hon. T. J. Smith of Butler, Mo., to hear the evidence and pass upon these issues. He filed his report September 8th, 1903, after having consumed about fifty days in the hearing of the case, in which he resolves all points against the telephone company, and in substance holds:

First: That the city has the right, as reserved in its charter, to fix reasonable telephone rates.

Second: That, inasmuch as there are two telephone companies, that is, the Missouri & Kansas Telephone Company of Kansas, operating all telephones up to the Missouri line, and the other the Missouri & Kansas Telephone Company of Missouri, operating all telephones in Missouri to the Kansas line, that therefore the interstate commerce question is not involved.

Third: That the rate is reasonable, and will yield a large profit on the capital invested.

While the burden of proving the unreasonableness of the ordinance rested upon the telephone company under Missouri law, the city took the "laboring oar," in order to avoid delay. It caused a complete survey of the physical assets of the telephone company to be made. And the commissioner from this showing finds the value of the physical assets to be about $850,000.00 It had the books of the telephone company, from its organization in 1882, to the date of the hearing, examined by the most eminent expert accountants obtainable in this country, namely: Edward P. Moxey of Philadelphia, a man of national reputation in his business, and W. F. Shelley of Kansas City, Mo.

In order to show the cost of producing telephone service in Kansas City, Mo., it had C. E. Stinson, president of the Memphis Home Telephone Company; A. L. Tétu, manager of the Louisville Home Telephone Company; J. J. Nate of the Stromberg-Carlson Telephone Manufacturing Company; J. C. Kelsey of Purdue University, Lafayette, Ind.; B. C. Halderman, city electrician, and formerly with the Bell company in Kansas City, Mo.; W. C. Polk of the Kansas City Home Telephone Company; and J. C. Tryon of Kansas City, Mo., go over the plant and the matter of operation in order to show the cost of telephone production in the city.

The company met this showing with some general testimony from Mr. McMean of the Western Electric Company.

The commissioner, in his report, calls attention to the fact

that while the telephone company had in its possession the best evidence of the cost of telephone production in Kansas City, Mo., for some reason it did not see fit to make the showing. It contented itself with generalities, and did not produce its president, Alonzo Burt, as a witness at all.

The showing made by the city (and the commissioner so finds) was to the general effect that, after making all allowances for depreciation, operation, maintenance, betterments, and so on, the company had from the beginning of its organization to the date of the hearing made an average net earning of 32 per cent on its capital invested. It further appeared, and the commissioner finds that the cost of producing telephone service in Kansas City, Mo., does not exceed $27 per telephone, after making all allowance for maintenance, depreciation, etc.

Using the language of the commissioner, verbatim, the following is his opinion as to the necessity of any concern purchasing Bell supplies to the exclusion of Independent devices:

"In my opinion the actual value and reasonable cost of these transmitters and receivers (meaning Bell) is not greater than the annual rental that has heretofore been paid by respondent therefor. And in my opinion, the evidence discloses no good reason why the transmitters and receivers manufactured and sold by Independent concerns could not be used in the giving of its service by respondent, with as satisfactory results to its patrons, and at less cost, than is incurred by using the Bell devices."

The commissioner points out the interesting fact that the Bell concern, in its alleged "measured service," or "message plan," is in fact forcing upon patrons (at least in a measure) a "flat rate" provision, because it charges a stipulated and fixed sum for the use of the instrument, regardless of how much or little it may be used.

In closing, the commissioner finds that there is no merit in the contention that the city should not enforce this rate; that it will yield an ample profit to the company. He points out clearly that there has been nothing in the history of the transactions of the Bell company with Kansas City which has tied Kansas City's hands so the people must continue to suffer under the monopoly.

The great and general question around which all of the minor ones revolve is whether the Bell monopoly can ignore state and municipal control and enforce its demands and exactions even to the extent of extortion?

The determination of this question in favor of the people, of course, interests the telephone public, and all the cities and hamlets of this country where there is not in the organic law something which has anchored them hopelessly under the wheel of the Bell monopoly. Kansas City's position in the commercial world will naturally attract attention to the outcome of this case, and the result should blaze the way for others to follow.

The record in this case (covering two thousand pages) will be published; likewise the opinion of the commissioner, and can be procured by people desiring to have it.

The general result is gratifying in that it shows that where municipal officers have the tenacity and courage to combat even the most potential monopoly, the result will be in favor of the masses of the people. This telephone fight is but a part of the general plan inaugurated by the mayor of Kansas City, Hon. James A. Reed, along the line of municipal reform. The fight has gone hand in hand with that against traction companies, the paving companies, the gas, and electric light companies, in all of which the same successful termination, either by compromise or by a litigation, has been brought about.

Kansas City's moves along these lines in the last four years afford profitable study for officers desirous of protecting the interests of the people against exactions of monopolies.

The full text of the findings of fact by Commissioner Thomas J. Smith here follows:

In the Supreme Court of the State of Missouri: State of Missouri, ex rel., J. W. Garner, Relator, vs. Missouri & Kansas Telephone Company, Respondent.

To the Hon. Supreme Court of the State of Missouri: The undersigned, your commissioner, appointed at the October term, 1902, to take the testimony upon the issues joined in the above entitled cause, begs leave to respectfully report, that after having taken and subscribed an oath to faithfully discharge his duties in the premises, which oath is herewith returned, he appointed as his stenographer to take and transcribe the evidence in the case, first Miss Katherine A. Tucker, who took and subscribed an oath herewith returned, for the faithful performance of her duties as such, who took the evidence and transcribed the same as contained in Volumes I and II of the evidence herewith returned. Afterwards, and before the completion of the taking of the evidence, and in order to expedite the work. Mr. Dudley W. Eaton was appointed stenographer to take the remainder of the evidence, which had not at that time been taken, and transcribe the same, who, before beginning his duties as such, took and subscribed an oath herewith returned, and whose transcript of the evidence as taken by him is contained in Volume III of the evidence herewith returned.

Having gone to Kansas City on two occasions for the purpose of beginning the work assigned to him, at which times no oral evidence was taken, the matter having been, by agreement of parties, adjourned from time to time until the 14th day of January, 1903, the taking of oral testimony was begun. The taking of testimony was from time to time and day to day adjourned, as shown in the transcript of the evidence returned, and was not finally completed until the 22nd day of April, 1903, at which time both parties announced they had no further evidence to offer in the case. All of the evidence taken is contained in the four volumes herewith returned numbered one, two, three and four, respectively, the oral testimony being all contained in volumes one, two and three, while volume four contains the exhibits offered and referred to in volumes one, two and three.

After the argument of the facts by counsel on August 5th, 1903, counsel for respondent submitted request for special findings of fact, which are herewith returned. I have in my findings attempted to cover each of the questions involved in these several requests.

Under the alternate writ and the respondent's return thereto, from the evidence offered in the cause, and the admissions of the parties, I find the following facts, to-wit:

1. That Kansas City, Missouri, is a municipal corporation organized under Sections 16 and 17 of Article IX, of the Constitution of Missouri, adopted in 1875; and that in pursuance of what is known as the Enabling Act of the General Assembly of the State of Missouri (Act of 1887, pages 42 to 51, incorporated in the R. S. of Missouri, 1899, Secs. 6359 to 6410), said city adopted a special charter framed by thirteen freeholders of said city, which said special charter was duly and legally submitted to, and ratified by the requisite qualified voters of said city at a special election held April 8th, 1888; and that in Sec. 1, Art. III thereof it is provided:

"The mayor and common council . . . shall have power, by ordinance, . . . to regulate the prices to be charged by telephone, telegraph, gas and electric light companies."

I further find as a fact that on September 8th, 1902, the Common Council of said city passed, and on September 10th, 1902, the acting Mayor of said city approved Ordinance No. 20,770, entitled, "An Ordinance fixing charges for the use of telephones in Kansas City, Missouri," which said Ordinance is in words and figures as follows, to-wit: "An Ordinance fixing charges for the use of telephones in Kansas City, Missouri."

Be it ordained by the Common Council of Kansas City, Missouri:

Section 1. No person, firm or corporation now or hereafter owning, controlling or operating any telephone line or system in this city, shall charge or collect as rental for the use of any one first-class modern telephone, transmitter and receiver, and for keeping the same in repair, and for first-class modern telephone service within the corporate limits of Kansas City, Missouri, an amount exceeding the sum of sixty dollars ($60.00) per year for any one first-class modern telephone, transmitter and receiver and service in a business office or house, whether the same be wall or desk telephone, when such business office or house is located within the corporate limits of Kansas City, Missouri; and no such person, firm or corporation shall charge exceeding the sum of thirty-six dollars ($36.00) per annum for rental for the use of one first-class modern telephone transmitter and receiver, and for keeping same in repair in any residence located within the corporate limits of Kansas City.

Sec. 2. Whenever any person, firm or corporation, now or hereafter owning, controlling or operating any telephone line or system in this city, shall charge or collect as rental for the use of telephones, transmitters and receivers, and for keeping them in repair, and for telephone service within the corporate limits of Kansas City, Missouri, a sum less than is provided in section one (1) hereof, said person, firm or corporation shall not thereafter charge more than said reduced sum.

Sec. 3. No person, firm or corporation, owning, controlling or operating any telephone line or system, as aforesaid, shall charge or collect in advance for telephone service set forth and named in the preceding sections, more than three months' service, which shall not exceed one-fourth of said annual charge.

Sec. 4. Every person, firm, association or corporation now or hereafter owning, controlling or operating any telephone line, system, or business, within the corporate limits of this city, shall supply all applicants for telephone connections and facilities with such connections and facilities without discrimination or partiality (excepting the difference of rates above specified), provided such applicant comply or offer to comply with the reasonable regulations upon the subject; and no such person, firm, association or corporation shall im-

pose any consideration or restrictions upon such applicant that are not imposed impartially upon all persons in like situation, nor shall they discriminate against any individual or company engaged in any lawful business.

Sec. 5. This ordinance shall not apply to cases where contracts are now in force with subscribers, prescribing a different rate, until said contracts have expired.

Sec. 6. This ordinance is limited to points within the limits of this city, and does not attempt to regulate charges which may be made for telephone service for points outside of the limits of said city.

Sec. 7. Any person, firm or corporation, owning, controlling or operating any telephone line or lines in this city, or any officer, agent or employe of any such individual, company or corporation, who shall charge, collect or receive for the use of any telephone transmitter and receiver, and for keeping them in repair, and for telephone service, any sum in excess of the rates fixed in this ordinance, shall be deemed guilty of a misdemeanor, and upon conviction thereof, shall be fined in a sum not less than one hundred dollars nor more than three hundred dollars for each and every offense. But this ordinance is not intended as a waiver by the city of any other remedy to which it may have the right to resort to enforce the provisions of this ordinance.

Sec. 8. The city reserves the right to further regulate the matter of telephone service, construction and rates from time to time as the best interests of the people and of the city may require.

Sec. 9. All ordinances or parts of ordinances in conflict with this ordinance, are, only in so far as they conflict with this ordinance, hereby repealed."

3. I find further that the respondent was on August 24th, 1882, under the laws of the State of Missouri, relating to telegraph and telephone companies, duly incorported as a telephone company, and that on the 12th day of September, 1899, respondent, through the action of its stockholders, held in pursuance of the provisions of our Statutes and after having taken the necessary steps as prescribed therefor, voted to accept, and did accept the provisions of Sec. 2509 of the R. S. of Missouri, 1899; and did also, under said Statute, extend its corporate existence for a period of one hundred years from the 6th day of July 1899, and that respondent caused a duly authenticated certificate, reciting these facts to be filed with the Secretary of State within and for the State of Missouri, on September 4th, 1899.

I further find that the location of its principal office or place of business is, and has been during all of said time, at Kansas City, Missouri, and that as originally incorporated, the capital stock of said company was in its certificate of incorporation recited to be the sum of one million dollars; which capital stock has, by action of its Board of Directors, from time to time been increased to the sum of three million one hundred and two thousand dollars; and that during all of said time the respondent has owned and operated at Kansas City, Missouri, a telephone plant or exchange, giving service to the inhabitants of Kansas City, Missouri, and the territory immediately contiguous thereto, in Jackson County, Missouri, and in Clay County, Missouri; and that until July 1, 1902, has operated as a part of its plant under lease from the Missouri and Kansas Telephone Company, a corporation organized under the laws of the State of Kansas, a telephone plant in Wyandotte County, Kansas, including the towns of Kansas City, Kansas, and of Argentine and Rosedale, Kansas.

Since the time of its incorporation until June 1, 1887, respondent had extended its lines and exchanges so as to give telephone service throughout the State of Missouri, excepting the City of St. Louis and some territory immediately contiguous thereto, and also extending over the state of Kansas, and into the Indian and Oklahoma Territories. On June 1, 1887, respondent sold and transferred to the Missouri and Kansas Telephone Company of the State of Kansas all of its property in the last named State, and took a lease to itself upon this property, which in June, 1902, was canceled, and all the property in Kansas, formerly owned by respondent, with additions thereto, was by respondent turned over to the Kansas corporation, which last named company has since July 1, 1902, operated the same upon an agreement with respondent for interchange of business, the terms of which agreement are not shown by the evidence.

4. I further find that Kansas City, Missouri, including Westport, and Kansas City, Kansas, including Armourdale and Argentine, Kansas, are for all business and social purposes one city, or a "collection of business houses and residences compactly located," and constitute in that sense one community.

Kansas City, Kansas, and Kansas City, Missouri, are two distinct municipal corporations, and are divided by the State line between Missouri and Kansas, but of this division there is no evidence, either in the manner in which the city is built, or the business methods of the people. Said State line, which divides the territory occupied by this urban community into different municipalities, is in some places in the middle of a paved or improved street, with business houses fronting said street on each side; at other places the said line, which is also the line between Kansas City, Kansas, and Kansas City, Missouri, passes diagonally through business houses and block, with parts of the same in each State; and at other points said line passes through business plants, dividing the same so that part of said plants is in each State, and in each of said municipal corporations. There is one undivided collection of houses, but by reason of the State line, located as above mentioned, there are necessarily different municipal corporations and city governments. There is also in the State of Missouri, but outside of its corporate limits, certain suburban communities with large populations. Respondent's telephone exchange was constructed, and in connection with the properties owned and operated by the Missouri and Kansas Telephone Company of the State of Kansas, operated for the common service of the inhabitants of all of the above mentioned cities and adjoining communities.

I find as a further fact that from the organization of respondent the Kansas City Exchange Territory, or the territory in which respondent furnished either directly or in conjunction with the Missouri and Kansas Telephone Company of Kansas, telephone service, outside of its toll line service, embraced, not only what is now the corporate limits of Kansas City, Missouri, but territory in Jackson County, Missouri, outside of the limits of Kansas City, Missouri, and contiguous thereto, and also the cities of Kansas City, Kansas, Armourdale, Rosedale and Argentine, in the State of Kansas, and certain territory adjacent thereto, but outside of the limits of said cities, and in the State of Kansas.

It is proper to state in this connection that the contention of the respondent, as made to your commissioner, and as attempted to be shown by the testimony of certain witnesses introduced by it, has been, that all of the telephone property, including wires, switchboards, and other appliances, used in the giving of telephone service in the territory adjacent to Kansas City, Missouri, and being in the State of Kansas, and included in what has been denominated the Kansas City Exchange Territory, is, and has been all of the time, in fact, operated by the respondent, whether owned by it or by the Kansas corporation.

It is true that certain employes of respondent, who were introduced as witnesses by it, testified to the fact, that so far as they know, all of the property lying within the Kansas City Exchange Territory, whether in the State of Kansas, or in the State of Missouri, was operated by the respondent, without distinction as to its location.

Upon the other hand, however, the relator introduced as a witness, Mr. J. R. Mulvane, who was then president of both corporations, who testified positively and explicitly, not only that all of the telephone property in any way connected with the respondent's property in the State of Missouri, but being in the State of Kansas, was, in fact, owned by the Kansas corporation, but had been, in fact, operated by it as an independent and distinct corporation since July 1st, 1902, under some traffic arrangement, the details of which, as stated, have not been disclosed in the evidence. In addition to this, the records of the defendant corporation were introduced by relator corroborating the testimony of Mr. Mulvane, as to the ownership of this property. Because of the fact that he must, necessarily, by virtue of his connection with the two companies, have known much more about the business arrangements and ownership of property of the respondent, and because of the fact that the General Manager of both of these companies, Mr. Burt, who is shown by the testimony in the case to live in Kansas City, Missouri, and who was also personally present before the commissioner during the taking of a considerable part of the evidence in the case, and who, by virtue of his position, would necessarily know what the facts were with regard to the question of ownership and operation of the property in Kansas, but who was not introduced as a witness at all, I find as facts established by the evidence, as stated, that not only the telephone property in the State of Kansas, which is connected with, and used as a part of, the plant composing the Kansas City Exchange Territory, is and since 1887, has been, owned by the Missouri and Kansas Telephone Company of the State of Kansas, but that it is, and has been, since July 1st, 1902, operated by said last named corporation, and not by the respondent.

I find, however, that it is true, as shown by the evidence in the case, that all of the shares of stock of the said Kansas corporation, except five shares, are, and have been since long prior to the institution of this action owned by the respondent, these five shares being owned and held by persons in Kansas, in order to qualify them as directors of said Kansas corporation. I find also that the officers of the two corporations are identical.

5. The respondent began to furnish telephone service, as stated, in the year 1882, and for that purpose had its general exchange, including its switchboards, so arranged and constructed, and its lines of poles, wires, cables and appliances so arranged, placed and constructed as to extend its telephone exchange service to all the territory and accommodate and serve all telephone users in what is known in this record, and designated, as the Kansas City Exchange Territory, without regard to State, county or municipal lines; and its said exchange system was so constructed, and so owned until the year 1887, when as stated, the property in Kansas was sold to and transferred to the Kansas corporation, hereinbefore referred to, but from that time was so operated by respondent until July 1st, 1902, as to cover all the territory included in the Kansas City Exchange Territory, viz., Kansas City, Missouri, including the former city of Westport; Kansas City, Kansas, including the former cities of Wyandotte, Armourdale and Rosedale, and Argentine, Kansas, and the immediate suburbs of said municipalities in Jackson County, Missouri, Wyandotte County, Kansas, and also the suburbs of Kansas City, Missouri, in Clay County, Missouri; and the said telephone system was designed and constructed to be and has at all times been so used as to afford every telephone user in said Kansas

City Exchange Territory telephonic communication with every other subscriber of said territory, regardless of where in said territory, either the telephone from or to which the call was made, was located.

But I find that it is not a fact (except as to a certain limited kind of service known as "private line" where a subscriber has a line connecting two points with a 'phone at each end and not connected with any switchboard) that the subscribers' station or telephone is primarily connected with any other station or telephone in the exchange territory; but that upon call made to the office with which he is connected he may by the operator there, or by a succession of operators, be connected with any other subscriber or telephone station within the exchange territory.

6. From the evidence I find further that respondent at the time of the institution of this suit, and for a considerable time prior thereto, in the handling of its business and giving the service which it has given, in its Kansas City Exchange Territory, as well as the toll line service, which it has given at Kansas City, Missouri, had had and maintained within the limits of Kansas City, Missouri, five offices, known respectively as Main Office, Grand Office, East Office, South Office, and Hickory Office; that the Main office has connected with it very much the larger portion of the business telephones in Kansas City, Missouri.

In addition to those offices, respondent, until July 1st, 1902, has, and for a long time prior to the bringing of this action, had maintained certain exchange offices located across the line in the State of Kansas, but owned by the Missouri and Kansas Telephone Company of Kansas, and in the limits of what is known as, and has been used by respondent and the Missouri and Kansas Telephone Company of Kansas as their Kansas City Exchange Territory.

I find further it to be a fact, as shown by the evidence, that in these several offices, as a part of the machinery by and through which telephone connection is made between the party calling and the party answering, are located what are known as and denominated switchboards, and that each of the offices of the respondent is, and necessarily must be, in order to render its service throughout this exchange territory in which the service is required, connected by what is known as trunk lines; that is to say, lines by which a person whose telephone is connected with one office may get connection and communication with any other subscriber in the exchange territory whose telephone is connected with any other office in this territory.

I further find that this system was constructed and designed to give an indiscriminate telephone service throughout this Kansas City Exchange Territory; but I find also from the evidence, that the plant is so constructed that the operators at the switchboards through whom service must necessarily be rendered, may and can know from the call made, whether or not the party calling and the party called are in Kansas City, Missouri, or in Kansas City, Kansas, or, in other words, may and can know the location of the party calling for service and of the party called. Knowing this, this same operator may know, should any service be confined to the limits of Kansas City, Missouri, whether or not the party is calling would be entitled to receive, without further charge, the service called for. If such service should be required, I find it to be perfectly feasible for a ticket to be made by the operator, charging the patron or subscriber with whatever may be the additional charge for service outside of the limits of Kansas City, Missouri.

The evidence shows, and I find as a fact, that respondent and other telephone companies in other classes of service, as for instance, the giving of long distance service to the local subscribers, adopts this plan of charging the subscriber with the amount charged by such company for such service, which amounts are collected at stated times from its several subscribers.

I find also that there are means or instrumentalities which may be adopted by respondent at only a nominal expense, by which the operator may know as soon as the call is made, without retaining in her memory, the location of the subscriber, the territorial extent or limit to which the subscriber calling would, under his contract, be entitled to service without extra charge therefor.

Or, in other words, the signal which the subscriber must necessarily give in order to obtain any service, may be, at a nominal cost, made to indicate the limits of the service to which he is entitled.

The signal given by the caller when he takes the receiver from the hook of his 'phone, is the burning of a small electric lamp at the switchboard over his number as registered there. In front of each of these lamps is placed what is called an "opal," which the evidence shows, and I find as a fact, may be colored or marked so as to indicate unerringly the character or limit of service to which the caller is entitled.

I, therefore, find as a fact, that respondent's plant, appliances, and instrumentalities are so constructed as that, without anything more than a nominal expense, and with impairment of the service, a service can be rendered by it to persons or subscribers, limited to Kansas City, Missouri, both as to the party calling and as to the party receiving the message, and which may, if the parties desire it, by the payment of whatever maybe charged therefor, be extended to the entire limits of what is denominated as the Kansas City Exchange Territory, just as such service is given by and through such plant over the toll lines of respondent.

7. The respondent has always and now has contracts with all its subscribers in the Kansas City Exchange Territory which are made for the definite period of one year, and thereafter renew themselves and continue in force until terminated by thirty days' notice from either party to the other of a desire to terminate the same at the expiration of any quarterly period.

These contracts (except those for private lines not connected with any switchboard of the respondent), contain the following stipulations relating to the telephone service to be furnished:

"The company shall, during the continuance of this contract furnish the subscriber upon call therefor, subject to the rules and regulations of the company and upon the terms herein mentioned, telephonic connection with the stations of all subscribers whose instruments are at the time of such call connected with the exchange with which the subscribers station is connected, and in construing the contract, the company's exchange at Kansas City, Missouri, and all branch exchanges thereof in Jackson County, Missouri, and in Wyandotte County, Kansas, that are connected therewith by trunk lines, shall be held to be one and the same exchange."

All the subscribers of respondent in that portion of the Kansas City Exchange Territory (except those having only private lines), have contracts containing the above provision.

8. I further find that relator is a practicing lawyer in, and a resident of, Kansas City, Missouri, and was such on the 25th day of September, 1902, and that he then had and still has his office in the New York Life Building in said city, located on Ninth Street in said city, and in the territory in which telephones are connected with respondent's Main Office; that at said time he had not, nor has now any contract expressed or implied, with respondent for telephone service, and on said date he made the written demand set out in the alternative writ herein; that said relator then and there offered to contract with respondent for one year's use of said telephone and service, and to pay for the same quarterly in advance at the rate fixed by the Ordinance of September 10, 1902, hereinbefore mentioned; and at the time of making said demand he tendered to the respondent in lawful money of the United States fifteen dollars as payment in advance for the rental and charges of said telephone and telephone service for three months, which demand and request the respondent then and there and ever since has refusd to comply with; that the respondent at the time of relator's said demand was not offering to furnish telephonic service to subscribers within the limits of Kansas City, Missouri, confined solely to connection with their subscribers within the corporate limits of said city.

I find that the respondent at the time of the demand offered to furnish relator a telephone and telephone service of the same character, at the same rates, and upon the same terms that it was then furnishing such telephone service to its other subscribers in the united cities of Kansas City, Missouri, and Kansas City, Kansas, including all of its Kansas City Exchange Territory, but not otherwise.

9. I further find that on September 3rd, 1901, there was duly passed by the Lower House of the Common Council of Kansas City, Missouri, an Ordinance entitled, "An Ordinance granting to John Enoch, his successors and assigns, the right, privilege and authority to construct, lay, maintain and operate in Kansas City, Missouri, through the public streets, avenues, alleys and thoroughfares thereof underground conduits, poles, wires and other appliances for the purpose of furnishing and supplying to Kansas City, Missouri, and the inhabitants thereof, a telephone system." At the time, and therefore, while said ordinance was pending, the Upper House of the Common Council of said city was composed of fourteen members, when all of said offices were filled. There had been at the regular election next preceding fourteen members elected to this Upper House, but prior to this time one of said members had died, and his place in the Upper House had not at the time been filled. On the fourth day of November, 1901, this bill was in the Upper House of the Common Council placed upon its passage and a vote taken, by ayes and noes, and recorded as taken, at which seven members voted for the passage of the bill, and six members voted against the passage of the same.

The bill was thereupon by the president of the Upper House Council declared to be duly passed and was afterwards, to-wit: on the 9th day of November, 1901, approved by the Mayor of Kansas City, Missouri. Said Ordinance, with the approval of the Mayor, is in words and figures as follows, to-wit: "An Ordinance granting for a term of thirty years to John Enoch, his successors and assigns, the right, privilege and authority to construct, lay, and maintain and operate in Kansas City, Missouri, through the public streets, avenues, alleys and thoroughfares thereof under ground conduits, poles, wires and other appliances for the purpose of furnishing and supplying to Kansas City, and the inhabitants thereof a telephone system.

Be it ordained by the Common Council of Kansas City,

"Section 1. That John Enoch, his successors and assigns be and are hereby authorized to construct, lay and maintain and operate in Kansas City, Missouri, through the public streets, avenues, alleys and thoroughfares thereof, underground conduits with the necessary manholes, house connections, and other appliances, and to place therein wires, conduits and such other appurtenances as may be necessary to operate same for telephone and telegraph purposes, and to erect and

maintain and use in said streets, avenues, alleys, and thoroughfares suitable poles for telephone and telegraph uses, and to place and maintain cables, wires and proper fixtures thereon for such purposes, and to construct, maintain and operate a general telephone and telegraph system in said city. The authority hereby granted and all rights and privileges hereby conferred upon said John Enoch, his successors and assigns, are subject to the conditions, terms and limitations and forfeitures herein prescribed.

"Sec. 2. Before exercising any of the rights, authority or privileges hereby granted, the said John Enoch, his successors and assigns, shall file with the Board of Public Works of said city, maps, plans and specifications showing the exact location, size and character of the proposed works, and the same shall be subject to the approval of said board, which may require and direct any changes in said maps, plans or specifications, or work thereunder, either before or at any time after it is performed, which shall be necessary for the protection of either public or private interests, and all subsequent additions, extensions, and changes in said work shall be subject to like approval. Said conduits and poles shall be placed in the alley-ways wherever it is practical to do so.

"Sec. 3. There shall be no poles or aerial structures or wires erected, constructed or maintained by John Enoch and his successors or assigns, within the area of territory within the city bounded as follows: On the east by the east line of McGee street; on the south by the south line of Thirteenth street; on the west by the west line of Washington street, and on the north by the north line of Third street; nor within the territory bounded on the north by the north line of Ninth street, on the east by the east line of Santa Fe street, on the south by the south line of Fourteenth street, and on the west by the west line of Liberty street. Within said areas all wires shall be underground, provided, however, service and exchange connections as provided in this ordinance may be made above ground surface, and for this purpose wires may extend from the underground system above the surface as far as it is reasonably necessary, and such connections and such service and aerial wires and necessary fixtures and structures for such purposes shall be subject to the approval of the Board of Public Works. Outside of said areas above bounded, the said John Enoch, his successors or assigns, may place and maintain poles, lines and fixtures in the streets and alleyways of the city, so far as it is practicable to do so. All said lines shall be made to conform to such requirements as to the size, location and painting of poles thereof, as may be prescribed by the Board of Public Works. All conduits to be provided with proper manholes, said manholes to be provided with proper drainage and cover. The city reserves the power and authority to extend from time to time, as the growth or necessity of the city may require, the boundaries of the territory within which such wires of said telephone system shall be placed underground.

"Sec. 4. The diameter and length of poles, kind, size and manner of attaching cross-arms and the manner of attaching cables on poles or system of poles, including distributing poles to be erected, shall be subject to the approval of the Board of Public Works. All poles, whether in streets, avenues, or alleys, shall be so placed as to interfere as little as possible with other companies using poles, and the Board of Public Works may at any time order and require said John Enoch, his successors or assigns, to change the location of any poles, and upon the failure of said John Enoch, his successors or assigns, to comply with notice or written order for such removal within the time specified in such notice, said Board of Public Works may cause the same to be removed at the expense of said John Enoch, his successors or assigns.

"Sec. 5. No street, avenue, alley or sidewalk shall be dug into by said John Enoch, his successors or assigns, in the construction or repair of any works without giving the Board of Public Works notice and obtaining the written consent of the board.

"Sec. 6. John Enoch, his successors or assigns, shall not at any time open or encumber more of any street, alley or sidewalk or thoroughfare than is necessary to enable them to perform the work with proper economy and efficiency in laying wires, cables, conduits, pipes or connections, nor shall they permit such openings or encumbrances to remain a longer time than may be necessary to do the work for which said openings have been made, and they shall put up and maintain about such openings and encumbrances, such barriers and lights as will prevent the happening of accidents by reason of such openings and encumbrances. Said John Enoch, his successors or assigns, shall restore such streets, alleys, avenues or sidewalks, opened by them, and all sewer, water or gas pipes or other underground constructions therein in a condition equally as good as when the openings were made, at their own expense, and shall keep that portion of any street, alley, avenue, sidewalk or thoroughfare opened by them in good repair for a period of one year after such restoration. Should said John Enoch, his successors or assigns, fail or refuse to restore any of said streets, alleys, avenues or sidewalks, within such time as may be designated by the Board of Public Works, then the same may be replaced and restored by the city under the direction of the Board of Public Works, at the cost and expense of said John Enoch, his successors or assigns, to be taken by the city out of the deposits provided for in the following section.

"Sec. 7. The said John Enoch, his successors or assigns, shall, upon the acceptance of this ordinance, deposit one thousand dollars with the city treasurer, for the faithful compliance with the stipulations made in this ordinance. The Board of Public Works shall have the right at any time to pay out a part or all of said thousand dollars for any purpose for which said sum is applicable under the terms of this ordinance, and whenever said board do so pay out all or any part of said sum for said purpose, then said John Enoch, his successors or assigns, shall within five days after receiving written notice thereof deposit with the city treasurer a sum equal to the amount so used.

"Sec. 8. The said John Enoch, his successors or assigns, shall furnish to the city a number of telephones, not to exceed thirty, and maintain and keep them in good repair and furnish telephone service therefor, which shall be equal to the best telephone service furnished to their subscribers, and put the same in public offices in the city and such offices as the Board of Public Works may designate without any cost to the city, and so connected with the system of the said John Enoch, his successors or assigns, as to be operated as a part of such system. The said John Enoch, his successors or assigns, shall put in whenever required by the Board of Public Works a system of telephones for the police and fire department service, which shall not be connected with the central switchboard (unless so directed by the Board of Public Works) at actual cost of same, which cost shall be simply the cost of adding such telephones to the general system, and keep and maintain the same in good repair after the system is in, at a cost to the city not to exceed six dollars per annum for each telephone, payable quarterly, at the end of each quarter. The number of telephones for such system and the location of the same shall be determined by the Board of Public Works. All street telephones shall be enclosed in a locked box or other suitable receptacle to be specified by the Board of Public Works.

Sec. 9. The said John Enoch, his successors or assigns, may charge rent for telephones in places of business within a radius of two and one-half miles from the intersection of Main and Twelfth streets, in said city, an amount not to exceed fifty-four dollars per annum, with an additional charge of six dollars per annum for each additional mile, or fraction thereof. For telephone in residences for residence use within a radius of two and one-half miles from said intersection of Main and Twelfth streets the charge shall not exceed forty-eight dollars per annum, and for each additional mile or fraction thereof an additional charge of six dollars may be made; and in the event that a subscriber using a telephone for business purposes desires to use a telephone for residence purposes, the residence telephone shall not exceed two-thirds the rental provided above for residence telephones, payable quarterly upon the same basis of distance heretofore mentioned. All telephones herein provided for shall be long distance telephones, with the best equipments for long distance conversations. All such rentals to be paid quarterly in advance. The foregoing charges to the city or other patrons shall include all necessary appliances, connections and exchange service. When telephones are not connected with such exchanges at either end of the line the rate shall not exceed twenty-four dollars per annum for such telephones, payable quarterly in advance.

"Sec. 10. The rights and privileges hereby granted to the said John Enoch, his successors or assigns, shall continue for thirty years from the date of the acceptance of this ordinance, unless sooner terminated as provided herein. Nothing contained herein shall be construed as granted to the said John Enoch, his successors or assigns, any exclusive rights or privileges.

"Sec. 11. The said John Enoch, his successors or assigns, agree by their acceptance of this ordinance to build, maintain and operate a telephone system in Kansas City, Missouri, within twenty-four months after the acceptance of this ordinance for the benefit of the city and the inhabitants thereof, and when any of the inhabitants of said city shall tender to the said John Enoch, his successors or assigns or agent, the amount of money to be charged for the telephone service for one quarter and agree in writing with the said John Enoch, his successors, assigns or agent, to use said telephone as long as he requires the use of a telephone, not to exceed five years, the telephone so furnished to remain the property of the said John Enoch, his successors or assigns, the same shall be put in within a reasonable time.

"Sec. 12. In consideration of the rights and privileges hereby granted to the said John Enoch, his successors or assigns, in addition to the foregoing stipulations for the benefit of the city, the said John Enoch, his successors or assigns, hereby agree and bind themselves to pay quarterly to the said city a sum equal to two per cent of the gross quarterly receipts of the telephone and conduit system within the city, payments to be made in quarterly payments on the 10th day of January, April and July and October of each year. Said payments to be made upon sworn statements of John Enoch, his successors or assigns, filed with the city comptroller, and the city comptroller or any committee of the common council, appointed for that purpose, shall have the right to verify the correctness of the statement filed with the city comptroller, and to correct same if found erroneous. If said statement is corrected, then said payment is to be made on the corrected statement the payment to commence from the expiration of twenty-four months limited herein for the completion of the plant.

"Sec. 13. The said John Enoch, his successors and assigns, by the acceptance of this ordinance, which acceptance is to be within ninety days from the final passage of said ordinance, agree to build, lay, maintain and operate an efficient telephone system and exchange in Kansas City, Missouri, with switchboard, conduits, wires and appliances sufficient to supply with telephones and telephone service thirty-five hundred subscribers, which system shall be completed within twenty-four months after the acceptance of this ordinance, provided not hindered by the city or any of its officers, strikes, fires or unforeseen causes over which they have no control. For the purpose of securing compliance with the provisions of this ordinance, the grantees herein agree on or before the acceptance of this ordinance to deposit with the city treasurer, United States, state or municipal bonds, to be approved by the city comptroller, in the sum of forty thousand dollars on the following condition, to-wit: If the said John Enoch, his successors or assigns, shall construct and put in operation a telephone system as above provided in this section, the city treasurer on the presentation of a certificate from the Board of Public Works that said telephone system has been so constructed and put in operation and the provision of this section fully complied with, shall return to the said John Enoch, his successors or assigns, the said bonds so deposited, but should the said grantee fail, neglect or refuse to put in operation such telephone system within the time herein specified then the said bond shall thereupon become the property of this city. The said John Enoch, his successors or assigns, shall have the right to clip, take and collect the coupons from said bonds as said coupons from time to time mature, while the bonds are so deposited and unforfeited.

"Sec. 14. Said John Enoch shall not, except as hereinafter provided, without the consent of the city, evidenced by ordinance, sell or transfer the conduits, poles, wires or appliances of any kind or description, or sell, lease, transfer or assign any of the rights or privileges herein authorized or granted to any person, company, trust or corporation, now or hereafter engaged in the telephone or telegraph or conduit business, or to any person for any purpose and shall not at any time enter into any combination directly or indicetlly with any person or persons or any corporation, concerning the rate to be charged for the telephone or telegraph service, and no officers, employes or managers of the conduit and telephone system authorized under this ordinance shall at the same time be in charge of or be officers, employes or managers of any other conduit or telephone system constructed or being operated in this city; provided, however, that said John Enoch may assign this franchise to a corporation organized by him under the laws of the state of Missouri, for the purpose of owning, constructing, maintaining and operating lines of telephones or telegraph, and provided further, that notice of said assignment shall be filed with the city clerk of Kansas City, Missouri, within ten days after the execution of said assignment.

"Sec. 15. In constructing, repairing and operating said conduit and telephone plant, the said John Enoch, his successors or assigns, shall use every reasonable and proper precaution to avoid damage or injury to persons or property and shall at all times, and in all places, hold harmless the city from all and every such damage, injury, loss or expense caused or occasioned by reason of any act, or failure to act, on their account, or through any carelessness of themselves or employes. Before, or at the time of their acceptance of this ordinance, said John Enoch, his successors or assigns, shall file with the city comptroller a bond in the sum of twenty thousand dollars, with sufficient surety or sureties, in favor of Kansas City, such bond and its sureties shall be subject to the approval of the city comptroller, its form shall be subject to the approval of the city counselor, conditioned that the said John Enoch, his successors or assigns, shall faithfully comply with the terms of this ordinance, and shall fulfill all of the conditions and stipulations therein contained, according to the full intent and meaning thereof in all respects. If the city

comptroller shall at any time thereafter deem it necessary to require a renewal of said bond, or a new bond, or surety, on like conditions, he shall have the power to do so. And if the said John Enoch, his successors or assigns, shall fail, neglect or refuse to file said bond for twenty thousand dollars before or at the time of said acceptance, as above provided, the rights and privileges hereby granted shall cease and terminate.

"Sec. 16. The said John Enoch, his successors or assigns, shall file with the city clerk of said city their written acceptance of the provisions of this ordinance in such form as may be approved by the city counselor within ninety days from the final passage of this ordinance. In case of failure of said grantees or assigns to file said acceptance within the time specified, then this ordinance shall be null and void.

"Sec. 17. All ordinances, or parts of ordinances, in conflict with this ordinance, are, insofar as they conflict with this ordinance, are hereby repealed.

"Passed September 3, 1901. Joseph Hopkins, Acting Speaker Lower House of the Common Council.

"Passed November 4, 1901. Geo. M. Shelley, President Upper House of the Common Council.

"In consideration of the fact that John Enoch has heretofore deposited with James Cowgill the sum of one thousand dollars, and that said John Enoch has this day delivered to me a written order upon the said Jomes Cowgill, directing him to turn said one thousand dollars into the city treasury, subject to the condition that it shall be returned to said John Enoch when he, his successors or assigns shall have deposited with the city treasurer of Kansas City the forty thousand dollars bonds provided for in this ordinance, and in consideration of the further fact that said John Enoch has deposited with Judge Francis M. Black, Hon. C. O. Tichenor, and Hon. O. H. Dean the sum of twenty thousand dollars, to be by them held in trust subject to the provisions of a certain written instrument, one copy of which is hereby attached and marked 'Exhibit A,' and because of the deposits aforesaid, as well as the benefits and privileges accruing to Kansas City and the inhabitants thereof under and by virtue of the terms of this ordinance, this ordinance is by me approved this 9th day of November, 1901.

(SEAL) JAS. A. REED, Mayor.

Attest: C. S. CURRY, City Clerk."

I find that John Enoch, the person named in said ordinance, on or about the 14th day of January, 1902, assigned and transferred to the Kansas City Home Telephone Company, a corporation organized under and by virtue of the laws of the State of Missouri, all of the rights, privileges and franchises granted to him by said ordinance, and on said date filed with the city clerk a notice of said assignment. The assignee, The Kansas City Home Telephone Company, on the first day of February, 1902, filed with said city clerk its acceptance, in a form approved by the city counselor, of said assignment and of the terms and conditions of said ordinance, covenanting and agreeing therein to carry out and perform all of its said terms and conditions.

The said Kansas City Home Telephone Company did, as provided in said ordinance, before exercising the rights and privileges granted by it, file with the Board of Public Works of Kansas City, Missouri, maps, plans and specifications showing the exact location, size and character of the proposed works, and that the same was approved by said board. Said Kansas City Home Telephone Company, upon the acceptance of said ordinance, to-wit: on February 1st, 1902, deposited one thousand dollars with the said treasurer of Kansas City, Missouri, as required by Section Seven of said ordinance, conditioned for the faithful compliance with the terms of said ordinance and the stipulations conditioned therein, to be used by the Board of Public Works for any purpose to which said sum might be applicable under the terms of said ordinance, as provided in Section Seven.

On February 1st, 1902, and within ninety (90) days after the approval of said ordinance, the Kansas City Home Telephone Company did deposit with the city treasurer of Kansas City, Missouri, as provided in Section Thirteen of said ordinance, bonds in the sum of forty thousand dollars, which were approved by the city comptroller, the condition of said deposit being that said Kansas City Home Telephone Company, the successor and assignee of said John Enoch, would construct and put in operation a telephone system as required by said ordinance.

By the terms of Section Fifteen of said ordinance, it is provided, among other things, as follows:

"Before or at the time of their acceptance of this ordinance, said John Enoch, his successors or assigns, shall file with the city comptroller a bond in the sum of twenty thousand dollars, with sufficient surety or sureties, in favor of Kansas City, such bond and its sureties shall be subject to the approval of the city comptroller, its form shall be subject to the approval of the city counselor, conditioned that the said John Enoch, his successors or assigns, shall faithfully comply with the terms of this ordinance, and shall fulfill all of the conditions and stipulations therein contained, according to the full intent and meaning thereof in all respects. If the city comptroller shall at any time thereafter deem it necessary to require a renewal of said bond, or a new bond or surety on like conditions, he shall have the power to do so. And if the said John Enoch, his successors or assigns, shall fail, neglect or refuse to file said bond for twenty thousand dollars before or at the time of said acceptance, as above provided, the rights and privileges hereby granted shall cease and terminate."

The evidence in the case entirely fails to show that there was any compliance upon the part of either said John Enoch or his successor or assign, the Kansas City Home Telephone Company, or both, with this provision of said ordinance.

I also find that on the 10th day of September, 1902, the Kansas City Home Telephone Company (having been duly incorporated under the laws of the State of Missouri, relating to telegraph and telephone companies, on November 25, 1901) was constructing a telephone system in Kansas City, Missouri (which also extends into Kansas City, Kansas) under permits issued by the Board of Public Works of Kansas City, Missouri, pursuant to and by virtue of said ordinance, and had on September 10th, 1902, expended an amount which the evidence shows was probably as much as fifty thousand dollars; and was prior to said last named date, and is now, engaged in constructing said telephone system, and had then entered into contract for the completion of said telephone system within the time fixed in said ordinance, at a cost for the whole plant in Kansas City, Missouri, and Kansas City, Kansas, of one million dollars, and that on January 27, 1903, it executed and delivered to the Germania Trust Company of St. Louis, Missouri, a mortgage upon all of its rights, privileges and franchises to secure the sum of three million dollars in bonds to be issued and delivered to said trust company for the purpose of raising money to build, equip and extend its plant, which, on January 29, 1903, was duly recorded in the recorder's office of Jackson County, Missouri.

I find further in this connection that on March 23, 1903, the following agreement was executed by the Kansas City Home Telephone Company, acting through its president, Joseph J. Heim, to-wit:

"This agreement, in duplicate, made and entered into on the 23d day of March, 1903, by and between the Kansas City Home Telephone Company, a corporation organized and existing under and by virtue of the laws of the state of Missouri and Kansas City, a municipal corporation organized and existing under and by virtue of the laws of the state of Missouri, witnesseth:

"That for, and in consideration of the mutual promises and agreements hereinafter made, and of the benefits to accrue therefrom to each of the parties hereto, said parties agree as follows:

"Said telephone company agrees to be bound by and to be subject to the provisions of a certain instrument of writing hereto attached and marked 'Exhibit A,' except as hereby and hereinafter modified, and to perform all acts and things required by said instrument to be done or performed in behalf of Kansas City as hereinafter and hereby modified.

"Said telephone company in lieu of section 9 of said instrument hereto attached and marked 'Exhibit A,' agrees to accept and be bound by and does hereby accept the schedule of rates as now fixed by section 1, of a certain ordinance of Kansas City, Missouri, entitled 'An ordinance fixing charges for the use of telephones in Kansas City, Missouri.' Approved September 10th, 1902.

"Said telephone company, however, agrees that it will not, prior to January 1st, 1907, charge more than fifty-four dollars ($54.00) per year for such a business telephone and service as is described in said section one of said ordinance, and thereafter, not more than sixty dollars per year for such telephone and service.

"Said telephone company further agrees to permit said city to connect at said city's expense, by not to exceed three trunk lines, such switchboards as said city may use exclusively in the operation of said city' police and fire alarm systems with said company's main exchange switchboard, and agree to furnish said city, local service for the same through said company's switchboards without charge for such service.

"Said Kansas City agrees that all construction work, which has heretofer been done by said telephone company, under and pursuant to the terms of said instrument hereto attached and marked 'Exhibit A,' as well as that which may hereafter be done by said telephone company in the streets of said city, under and pursuant to the terms of said instrument, shall be permitted to remain and be used by said telephone company upon the terms of said instrument hereto attached and marked 'Exhibit A,' as hereby modified and by said city upon the terms hereinbefore specified.

"This agreement shall have no force and effect unless approved and ratified by ordinance passed by concurrent vote of a majority of all members elect of each house of the common council of said city within ten days from the date hereof, and said ordinance when passed shall form a part of this agreement.

"In witness whereof the Kansas City Home Telephone Company has caused these presents to be executed by its president, and attested by its secretary, the day and year herein written.

"THE KANSAS CITY HOME TELEPHONE COMPANY,
"By Joseph J. Heim, President."

"Attest: C. C. SNIDER, Secretary.
"Attest: BAXTER BROWN, City Clerk.
"By E. D. Howard, Deputy."
(SEAL.)

On said date, March 23, the same was ratified on behalf of Kansas City, Missouri, by the following ordinance, which was duly passed by a majority vote of both houses of the Common Council of said city, and approved by the Mayor thereof, March 24, 1903:

"An Ordinance confirming contract with the Kansas City Home Telephone Company.

Be it ordaincd by the Common Council of Kansas City, Missouri,

"Section 1. That the contract hereto attached between the Kansas City Home Telephone Company and Kansas City be, and the same is hereby confirmed and entered into and executed on the part of the city and the city clerk is hereby directed to attest the same and affix the seal of the city thereto.

"Sec. 2. All ordinances and parts of ordinances in conflict herewith are, insofar as they conflict, hereby repealed."

"Exhibit A" referred to in said contract is a copy of the John Enoch Ordinance, copies in the former part of this paragraph.

10. I find the territorial boundary of Kansas City includes an area of about twenty (20) square miles, and that the distance between the north and south boundary lines of said city is more than five miles, and the distance between the east and west boundary lines thereof is more than six miles, and that said city has a population of about 175,000.

The number of telephones in use in the Kansas City Exchange Territory, and outside of the corporate limits of Kansas City, Missouri, is approximately fourteen hundred and fifty (1450), and the number within said limits approximately nine thousand five hundred (9500).

11. I find further that respondent now has a large number of telephone subscribers in Kansas City, Missouri, to whom it is fur-

nishing telephone service, and to whom it was furnishing the same on the 10th day of September, 1902, and long prior to that time, whose telephones are located at a greater distance than three and a half miles from the intersection of Twelfth and Main Streets in said city.

From the intersection of Twelfth and Main Streets in Kansas City, Missouri, to the limits of said city in an easterly direction is more than five miles, and in a southerly direction is more than four miles. There is a large population in that district lying to the east, as well as that lying to the south, situated beyond a radius of three and a half miles from the intersection of Twelfth and Main Streets, and respondent has a number of telephone subscribers and first-class telephones located in said district, but the evidence does not show, even approximately, the number of such telephone or telephone subscribers.

12. I find from the evidence in the case that at the time of the incorporation of the respondent, there was an arrangement between the respondent and the American Bell Telephone Company by which respondent agreed to, and did give to the American Bell Telephone Company thirty-five per cent (35%) of its capital stock for a perpetual license from the American Bell Telephone Company to respondent for the use of the patents held by the American Bell Telephone Company, covering the principles of transmitting the human voice over telephone lines, and of certain appliances used in connection therewith.

While said company was incorporated, as stated, at a capital stock of one million dollars, I find as a fact that the value of all its physical assets at that time did not exceed the sum of $200,000; notwithstanding which fact, there was issued and delivered at the time to the American Bell Telephone Company of the capital stock of respondent, as in payment for the license aforesaid, stock amounting to the sum of $350,000; and afterwards there was issued and delivered to the American Bell Telephone Company by respondent stock amounting to $73,769, on March 1st, 1887, when respondent purchased the plant of the United Telephone Company, which last named amount of stock was delivered to the American Bell Telephone Company for, or in payment of a license from said American Bell Telephone Company to respondent to do business over the territory that had been occupied by the United Telephone Company's plant.

I find that since it began business and out of the earnings of respondent it has made good or paid up in cash all of this capital stock, except the sum of $200,000, and in addition thereto, earned an average annual dividend on the amount of the alleged capital employed of 25 6-10 per cent.

13. I further find that from about the time of the organization of the respondent company, the American Bell Telephone Company has owned and held, either individually or in connection with the American Telephone and Telegraph Company, a majority in interest of the capital stock of respondent.

The evidence in the case tends to show, and I find as a fact, that the American Bell Telephone Company and the American Telephone and Telegraph Company are practically one in interest.

I find that during its entire existence respondent has used in giving service to its subscribers only the transmitters and receivers manufactured by the American Bell Telephone Company for the rental of which, including the keeping of the same in repair and replacing those destroyed, respondent had paid the Bell Company as rental for each 'phone furnished annually amounts as high as three dollars sixty cents ($3.60) until in 1902, when in lieu of a stated amount per 'phone respondent agreed with the Bell Company to pay annually for such transmitters and receivers and keeping the same in repair four and a half per cent (4½%) of its gross receipts.

In my opinion the actual value or reasonable cost of these transmitters and receivers is not greater than the annual rental that has been heretofore paid by respondent therefor.

In my opinion the evidence discloses no good reason why the transmitters and receivers manufactured and sold by Independent concerns could not be used in the giving of its service by respondent with as satisfactory results to its patrons and at less cost than is incurred by using the Bell devices.

14. The evidence shows, and from it I find that, among the telephone companies known as Bell Companies, that is to say, the class of companies that use the transmitters and receivers of the American Bell Telephone Company, and which are controlled, as is respondent, in its policy by said American Bell Telephone Company, there are two methods of fixing charges for telephone service, one of which is denominated the "flat rate" and the other the "measured service" rate or system.

The "flat rate," so called, is a uniform, fixed, charge or rental for a stated period to be paid by each patron having a telephone, regardless of the amount of use made of it or the telephone service required by the subscriber. There are different kinds of "flat rates," as, for instance, those for business houses, and "flat rates" for residences, but the charge for each class is uniform, and is not based upon the amount of telephone service rendered, but on the length of time the telephone may be installed in the residence or place of business, as the case may be, of the patron.

The "measured service" method of fixing telephone rates has in it, in the first place, the element of the "flat rate" system, as well as a system of charging for the service rendered in addition to what may be rendered under what is properly classified as "flat rate"; that is to say, the "measured service" system requires the subscriber or patron to pay a definite amount for each stated period, after his telephone has been installed, without regard to whether or not he uses the telephone at all, he being, however, as the evidence shows to be respondent's custom, permitted to make from six hundred to one thousand calls per year; then, the patron is required to pay a stated amount, generally four cents, per call for each call made in excess of the prescribed limit. Under the so-called "measured service" system, the evidence shows that the rental paid or charge made by the telephone company for the service, if the calls are kept within the prescribed limit is lower than the rate of charge for unlimited service for the same district.

But I find that the respondent has from the time it began business in Kansas City, Missouri, used the "flat rate" system for telephone service to its patrons, and that at the present time very much the larger portion of its business is done upon what is termed the "flat rate" system, but that in fact it gives an option to its patron to select which of the two systems it will adopt when service is by the patron contracted for.

I find also that in the larger cities there is a wide variance between the number of calls made by the different subscribers, varying according to the business demands of such subscribers. The account kept by the respondent on one day in the Kansas City Telephone Exchange, as shown in the evidence, showed the range of calls over the 'phones in use to vary from two as the lowest, to one hundred seventy, the highest calls made over a single 'phone.

I find that the cost of operating a system of telephones, both as to the time of the operators and the use of the plant, is dependent to a certain extent upon the number of messages originating at the various stations. One effect of the "measured service" plan is the tendency to minimize the use of the telephone so as to bring the number of calls within the prescribed limit in the contract, which would necessarily tend to prevent the use of the telephone for trivial and unnecessary messages, and thereby lessen the work of the operator and enable him to give more efficient and prompt service for business calls.

The "flat rate" was the original system of fixing the rate of charge to the subscriber. The so-called "measured service" is an innovation adopted by the Bell companies, and not used by what are styled Independent companies.

15. I find there are in use by the municipal authorities of Kansas City, Missouri, thirty-three telephones and four extension sets, from which service is given by the respondent over the entire Kansas City Exchange Territory, of which number no charge has been made for service from nine of said 'phones; as to the remainder of which the evidence shows a charge stands against each of said 'phones for an alleged unpaid balance.

"Extension sets" consist of an additional set or sets of transmitters and receivers and appliances immediately connected therewith used by the subscriber in calling for service and in communicating with others over the telephone system. This set is connected with the subscriber's other set and the two receive service over the one line.

16. I find from the evidence that all of the subscribers of respondent whose telephones or stations are located in Kansas City, Missouri, and in number about 9,500, on January 1st, 1903, are primarily connected with one or the other of the switchboards in the offices located in Kansas City, Missouri, except that in the southwestern portion of the city of Kansas City, in the vicinity of Twenty-ninth and Thirtieth streets and South West boulevard, there are seven 'phones which are, and since prior to the institution of this suit have been, primarily connected with an office and switchboard in Rosedale, Kansas, owned and operated by the Missouri and Kansas Telephone Company of the state of Kansas. In order to get telephone service or telephone connection with other 'phones in the same vicinity in which these seven 'phones are located, the message is sent, as stated, to the Rosedale (Kansas) office, a distance of about 7,200 feet in a southwesterly direction, trunked back to the northeast and along the same street a distance of about 16,600 feet to the respondent's Grand Office on Main street, near Sixteenth street, where connection is finally made with other 'phones in the immediate vicinity of these seven, some of them being directly across the street from where the 'phone calling is located.

The evidence shows, and I find, that on direct line these seven 'phones are located only about 9,400 to 9,600 feet distance from respondent's Grand Office.

These seven 'phones were installed respectively on the dates following: October 13, 1899; November 17, 1899; June 27, 1902; two 'phones July 8, 1902, July 24, 1902, and September 15, 1902.

17. I find from the evidence that on October 1st, 1897, the respondent's board of directors at one of its stated meetings caused the following entry to be made in its record book with regard to rates, which should be charged by respondent for telephone service, to-wit:

"METALLIC RATES IN KANSAS CITY, MISSOURI.

"Voted: That from October 1st, 1897, rates for metallic circuit

subscribers in Kansas City, Missouri, with long-distance transmitter on ordinary wall back boards (small) within one mile of the exchange be as follows, attached:

"UNLIMITED METALLIC CIRCUIT SERVICE.

Business—One party with special metallic circuit	$100.00
Two parties on same circuit (each)	80.00
Three parties on same circuit (each)	72.00
Residence—One party with special metallic circuit	80.00
Two parties on same circuit (each)	63.00
Three parties on same circuit (each)	57.00
Line Charge—(Beyond one mile from the exchange), for each quarter mile per annum added to above rates	10.00

However, I find as a fact that during all of the years since the incorporation of respondent there has been, in fact, and in practice of respondent in that regard, no distinction in the prices charged for telephone connection and telephone service as between persons living in Kansas City, Missouri, and those outside of Kansas City, Missouri, but within the Kansas City Exchange Territory, except in so far as the same may have been affected by the distance of a subscriber's station from the exchange with which it was connected, it being and having been the practice of the company during all of said time to make what is denominated a *line charge* to subscribers whose stations were more than a mile from the exchange with which he was connected, this line charge being six dollars for each additional quarter of a mile the 'phone is located from the exchange office with which it is connected.

I find further that at and prior to the institution of this action the rates charged by the respondent for first-class, unlimited telephone service in a business house, and for all the apparatus necessary to such service, and keeping the same in repair, where the subscriber's station was within one mile of the office or exchange with which it was connected, are and have been ninety-six dollars ($96) per year, with a line charge of six dollars per quarter of a mile for each additional quarter of a mile distance between the subscriber's station and the office with which it was connected; and that for a like service within one mile radius for a telephone in a residence the respondent's charge is and has been sixty dollars per annum with the same like charge as made for a telephone located in a business house.

18. In the absence of some showing to the contrary, and no such showing has been made, I find that it is reasonable to conclude, and therefore I do conclude and find, that the rates of charge as made by the respondent for its telephone service throughout its entire system, have been so adjusted as that, after taking into account the cost of maintaining in good working order the property over and by which this service is rendered, and the cost of building and of operating such property, or giving such service, the returns upon the investment should be ratably the same throughout its entire system. This being true, it is important, in my opinion, to ascertain what has been the history of the respondent in the matter of net returns upon the capital stock invested throughout the entire territory covered by it.

The testimony of Mr. Shelley, one of the experts who examined the books of respondent, is to the effect that, taking into account the actual and true amount invested by respondent, after the entire cost of maintaining in good working condition its entire plant, during its history of twenty-one and one-third years, the net returns upon the amount invested have been on an average thirty-two and a half per cent per year.

These are the facts as testified to by him as being shown by the books of the respondent. These facts are not controverted by the testimony of any witness introduced in the case, and have in no respect been impeached by the respondent; and I, therefore, find the facts to be that respondent's stockholders have received, either in dividends or by way of addition to the plant of respondent, or in reserve or surplus accounts, an average of thirty-two and a half per cent (32½%) upon the capital invested in this plant from the time respondent began the operation of the same until January 1st, 1903. That the property has been maintained during all of this time, and is now in first-class condition, so as to give first-class service, is not denied by the respondent, but is specifically affirmed to be a fact in its return to the alternative writ of mandamus.

I find these facts to be true and the results of the operation of respondent's system to be as stated, notwithstanding the fact that the evidence shows that the respondent began its business at a time when the telephone art was yet in its infancy, and the art but little developed or understood, as compared with conditions as they now exist.

19. If it shall be determined by the court that respondent must comply with the provisions of the ordinance upon which this action is grounded, and must furnish to such of its subscribers in Kansas City, Missouri, as desire the same, a service confined to the limits of said city at the rates prescribed in this ordinance, it does not follow as a fact that the revenue received from such local service will be the only revenue which will be derived by respondent from such subscribers, or for the use by them of respondent's local property and operators in connection therewith.

The business and social relations of the people living within the limits of Kansas City, Missouri, with those outside of such city limits, but within the Kansas City Exchange Territory are such that necessarily there will be, having as they do the facilities at hand, very considerable intercommunication over the telephone lines covering this territory and connecting the properties of the two corporations owning and operating the same, and a consequent revenue will be received by each of them therefrom.

In addition to this the subscribers use their local 'phones in long-distance connection—that is, in connecting with those subscribers of these two telephone companies who are outside of the Kansas City Exchange Territory, and for which use the subscriber pays respondent, in addition to its annual rentals for local service.

Because of these facts, I find that the property of respondent in Kansas City, Missouri, which is used in giving a local service, is, and will be, an efficient factor in producing to the respondent a revenue outside of this local service, and for these reasons this additional revenue should be considered in arriving at what should be a reasonable charge made by respondent for its local service in Kansas City, Missouri.

I do not find it to be true that only the property and operators of the respondent used by it in giving its local service would be used in producing its long-distance service or service outside of the limits of Kansas City, Missouri; but I do find it to be a fact that such property and operators are used in connection with other property and operators in Kansas City in producing this long-distance service.

And because of these facts, I find that such property and operators used for producing local service are efficient factors in producing for the respondent revenue derived from service produced by it other than local; and for these reasons such additional revenue should be considered in determining what is a fair rate of charge for its service purely local.

What are the value of this local property and respondent's operators used in giving this local service in producing this outside service are facts which I find to be peculiarly and almost necessarily exclusively within the knowledge of respondent's officers and servants.

Respondent has failed by any evidence introduced in the case to show what is the value of such use or service. The evidence, however, does show that, for the year 1901 more than twenty-six per cent of the total receipts of respondent, as shown on its books, was derived from toll service, and for the year 1902 more than twenty-seven per cent of its total receipts were received from such service, amounting for the year 1902 to about $323,000. What portion of this revenue should be credited to the use of respondent's plant and employes used in giving local service in Kansas City, Missouri, the evidence does not show.

There is evidence, however, in the case tending to show that in the matter of expense or cost of operation of the whole system claimed by respondent to have been operated by it, the proper share of what is denominated the Kansas City Exchange Territory, is fifty per cent, and of this fifty per cent, sixteen per cent, or eight per cent of the whole system, should be charged to that part of the Kansas City Exchange Territory lying outside of the corporate limits of Kansas City, Missouri, leaving forty-two per cent chargeable to Kansas City, Missouri.

If a like division of the toll revenues should be made, it would yield to the Kansas City (Missouri) property a revenue of over $133,000.00.

The evidence in the case shows that for the salaries of all persons employed distinctively in the toll-line service at Kansas City, Missouri, the wages paid amount to less than $25,000 per year. Of course, in producing this toll service an operator is required at each end of the line, and at the other end, for reasons heretofore stated, most likely a materially larger amount should be charged to this service.

But, upon any hypothesis arising upon the evidence in the case, a very considerable revenue, as stated, is derived by respondent for use of its distinctively local plant in giving toll service.

20. It was claimed by counsel for respondent in argument that by reducing all of the telephones in Kansas City, Missouri, where the rental charge has been above the price fixed by the ordinance under which this action was brought, to the limit therein prescribed, and leaving the charges upon those 'phones for which respondent claims it receives a lower amount than prescribed by the ordinance, there would be received on an average per 'phone only thirty-five dollars forty seven cents ($35.47), which respondent claims is no more than the cost of producing telephone service in Kansas City, and reference was made to Exhibit No. 85, prepared by Mr. Richart, respondent's cashier (shown at page 1402 of the record), from which it is claimed the entire income for telephone service in Kansas City, Missouri, with the number of 'phones shown in this exhibit—9,415—would be $333,985.40, or an average of $36.47 per 'phone.

Respondent's able counsel have very kindly, in their argument, furnished tables showing the whole amount of *rental* received from the 'phones in use in Kansas City, Missouri, as shown in the table

of Mr. Richart, and have given a correct summary thereof, which is as follows:

YEARLY REVENUE FIGURED IN ACCORDANCE WITH CITY ORDINANCE, AS OF DECEMBER 31, 1902.

Number of Telephones.		Total Amount.
28	Business telephones at yearly rental less than $60	$ 1,377.00
2,679	Business telephones at $60 per year	160,740.00
39	D. H.	.....
481	Extension sets at yearly rental less than $60	10,845.00
8	Extension sets at $60 per year	480.00
6	D. H.	.....
939	Measured service telephones at yearly rental less than $60	36,509.00
7	Measured service telephones at yearly rental of $12	84.00
206	Measured service telephones at yearly rental of $60	12,360.00
4,393		$222,395.00

RESIDENCE TELEPHONES.

7	Residence telephones at yearly rental less than $36	$ 168.00
13	D. H.	.....
1,384	Residence telephones at yearly rental of $36	49,824.00
20	Extension sets at yearly rental of less than $36	414.00
1	Extension set at yearly rental of $36	36.00
3	D. H.	.....
2,230	Measured service telephones at less than $36 a year	49,170.00
89	Measured service telephones at $36 per year	3,204.00
3,747		$ 93,816.00

4,393	Business telephones brought forward	$222,395.00
3,747	Residence telephones brought forward	93,816.00
449	Private branch exchange telephones at less yearly rate than $60	13,729.20
19	Private branch exchange telephones at yearly rental of $60 per annum (not including trunks)	1,140.00
807	Hotel sets	2,905.20
61	D. H.	.....
9,415		$333,985.40

Average per telephone, $35.47, under ordinance.

It seems to me the vice of respondent's argument in this respect lies in the fact that no account is taken, either in this argument or in the exhibit referred to, upon which it is based, of the fact that for a great number of these 'phones a message rate is received in addition to the stated rental. For instance, the exhibit shows there are 807 hotel sets furnished to four of the leading hotels in Kansas City, Missouri, to-wit: the Baltimore, Midland, Coates and Savoy. It is shown that there are ten trunk lines running to each of these hotels, and that while respondent receives as *rental* for the 'phones located in the several rooms of the hotel only the sum of $3.60 per year per 'phone (and this is the basis assumed as correct by respondent's counsel), the respondent's evidence does show that for each outgoing message from these sets, that is going out over respondent's system, it receives a message fee of two and a half cents.

In this table respondent's counsel have also failed to consider what would be received, if the service should be required as provided in the ordinance upon which this suit is based, from communication by its Kansas City, Missouri, subscribers with other subscribers in the Kansas City Exchange Territory, but outside of the corporate limits of Kansas City, Missouri, as well as what should be properly credited to the local plant in its long-distance service.

The testimony of Mr. Barret, respondent's own witness, as well as the peg count, introduced in connection with his testimony, shows the average number of calls per line in the Kansas City Exchange Territory on the day covered by this peg count, January 10, 1903, were twenty and four-tenths (20.4), producing to respondent fifty-one cents (51c) per line, per day for message fees, or for the forty lines connecting the hotels with respondent's switchboards, twenty dollars forty cents ($20.40) per day, aggregating for message charge from these sets $7,446, or a total revenue of $10,451.20, instead of $2,905.20, as claimed by respondent. This is but an illustration which your Commissioner has not attempted to apply to any other class of 'phones or service in respondent's system, and is based upon the assumption, there being no proof directly sustaining this assumption, that the trunk lines connecting these hotels with respondent's switchboards are used as much as the average lines of respondent's exchange in Kansas City.

There are, however, slightly more than twenty 'phones per line connecting these hotels with respondent's switchboards, while for the remaining lines in this territory the average number of 'phones is very slightly above one and one-half.

I have been unable, however, to see the wisdom as a business policy for the respondent to furnish, as is attempted to be shown by this exhibit as prepared by Mr. Richart, No. 85, a very large number of 'phones for which it would receive the yearly rental or income of only three dollars sixty cents ($3.60), twelve dollars ($12), or eighteen dollars ($18) per 'phone, and at the same time claim that the cost of maintaining and giving service over these 'phones should be approximately thirty-five dollars per annum.

The financial history of respondent, as disclosed in the testimony and exhibits of Messrs. Moxey and Shelley, do not, in my opinion, tend to sustain, even remotely, any such hypothesis.

As has been suggested, the evidence shows the larger portion of these 'phones are those from which message rates are received in addition to the rental. What is the amount of such message rate is a fact which lies peculiarly within the knowledge of respondent's officers and servants, and because respondent has failed to furnish any evidence upon that question, I conclude that the evidence, if produced, would not have sustained its contention in this particular.

The whole cost of giving telephone service in Kansas City, Missouri, and maintaining the plant, predicated upon the fact that the average cost per 'phone is twenty-seven dollars, and upon there being 9,415 'phones, as shown in Mr. Richart's table, would be $254,205, adding interest at the rate of eight per cent upon $857,000, which I find to be the correct value from which to figure the rate of interest and depreciation, and also six per cent for depreciation, or fourteen per cent for the two, the total amount of interest and depreciation will be found to be $119,980, added to the cost of maintenance and operation, will be found to be $374,185, or only $40,199.60 in excess of what respondent would receive from these 'phones under the ordinance by limiting the rental for all those which are equal to, or above, the prescribed rates, to the rates as provided in said ordinance, and leaving the rental of all below such rates as they now stand, and leaving entirely out of consideration, as stated, the message rates that are received on limited service 'phones in Kansas City, Missouri, the amount that would be received for service extending outside of said city, but within the Kansas City Exchange Territory, and the proper proportion of the revenue received from the long-distance or toll service which should be credited to this Kansas City (Missouri) plant. From the evidence, while there is no exact data from which to figure, I have no doubt that these sources of revenue, if the ordinance were enforced, would very greatly exceed this sum of $40,199.60. There is not, on the other hand, even a scintilla of evidence in the record, in my judgment, which tends to prove that the revenue which is received for this service outside of the local rental does not, in fact, exceed this amount of money.

21. With regard to the value of respondent's plant located within the limits of Kansas City, Missouri, there has been so much difference in the estimates made by the several witnesses who have testified in the case as to those values that I have had no small difficulty in satisfying my own mind as to what is the fair and reasonable value of the respondent's plant within the limits of said city.

The testimony of certain witnesses introduced by relator tends to show that the full, actual value was in the neighborhood of about $800,000, while the evidence offered by respondent tends to show a value of over one million dollars, upon the assumption of the plant being new.

The evidence shows to my mind, and I find, that the large switchboards manufactured by certain Independent manufacturers are as durable and will give as good service as those manufactured by the Western Electric Company, and may be bought at about fifteen per cent less than switchboards of like pattern are sold by the Western Electric Company.

Notwithstanding this, the respondent has purchased all of its larger switchboards from the Western Electric Company, it being shown to be the policy of respondent and all Bell companies to purchase such switchboards only from the Western Electric Company, and this policy is pursued by it without investigation as to the relative values or cost of such properties.

I find from the evidence that the real estate owned by respondent, including buildings, and on which are located its several Exchange Offices in Kansas City, Missouri, is of the value of $160,000.

Lists of the physical assets owned by respondent and located in Kansas City, Missouri, with the supposed values thereof when new, were furnished and filed, one by Mr. Lichty, and to which he testified, showing the original cost of the line equipment in Kansas City, Missouri, to be, in round numbers, $576,000; and one list furnished by Mr. Barrett, respondent's electrician, which shows, and in this it is corroborated by his testimony, that the remaining equipment of respondent in Kansas City, Missouri, cost it in round numbers $360,000.

The figures of Mr. Lichty, as suggested, are based upon what he claims would be the cost of new equipment in the items covered by his estimate; but in his testimony he admits that this property has depreciated in value as compared with that which is new from three to twenty per cent on the several classes of property covered by his lists. That his estimates are, in some respects at least, above what would be the actual cost of new construction, I think established by the weight of the evidence in the case. His estimate of values on the open wire equipment, for instance, is about thirty per cent above what the weight of the evidence shows to be the actual value of material used and the labor expended in building this line equipment.

That the switching equipment cost respondent approximately $360,000, as shown by the exhibit of Mr. Barrett, I think it fairly well established in the case, but, as stated, the evidence shows that as good equipment could have been purchased from other manufacturers than the Western Electric Company at an approximate cost of $300,000.

In my judgment the evidence shows, after taking into account a fair amount of depreciation, considering the length of time the several portions of this plant have been in use, that its present cash value is not exceeding $935,000.

The respondent's own evidence shows that of these assets, the line and switchboard equipment, and which I find to be of the

value of approximately six hundred thousand dollars, only about fifty-five per cent is or ever has been in actual use. In view of the fact that this property is shown to depreciate after being installed, and as claimed by respondent quite rapidly, it seems to me that the subscribers ought not be required to pay on the full amount of this part of the investment where only fifty-five per cent of it is used in giving service.

I find, however, that the respondent as a business proposition should not be required to receive a return upon only the property actually in use; but that it, being a public service corporation, ought to be prepared with its equipment so as to readily render service to such additional subscribers as should demand service from it. In my opinion the history of the respondent and the development of its business in Kansas City, Missouri, as disclosed by the evidence, does not justify it in claiming that its subscribers there should pay on approximately forty-five per cent of what to them is dead capital.

In my judgment an equipment which is at all times sufficient to meet the demands of this city and at the same time provide in advance for all of the subscribers or business which it can reasonably anticipate will demand service of it within the next twelve months, ought to be as much equipment as respondent's patrons should be required to pay upon.

The evidence shows that to this line equipment, excluding, as I have done, the pole line, when the construction is aerial, and the conduits where it is underground, any needed additional equipment can be added readily and at about the same cost as if all built at one time. The evidence does not show that in any one year the increase of respondent's business required the use of additional equipment amounting to twenty-five per cent of that required for actual service at the beginning of such year.

I have, however, allowed in my estimate of value for fixing what I find to be the correct basis of value upon which rates should be predicated approximately thirty per cent equipment in excess of that in actual use.

I therefore deduct from the $935,000, which I find to be the approximate, true value of respondent's property in Kansas City, Missouri, fifteen per cent of the $600,000, the value of the line and switchboard equipment, an excessive equipment, finding the correct approximate value for the ultimate purpose of this case as $57,000. this result being ascertained by dividing $600,000 by 115, and deducting the product, $521,739, from $600,000, giving approximately $78,000, which deducted from $935,000, leaves $857,000, as stated.

22. The respondent's books were examined by Mr. Edward P. Moxey, and also by Mr. Shelley, expert accountants, who respectively prepared tables showing the results of their examination upon certain features supposed to be bearing upon the matters in issue in this case, which tables are filed as exhibits, along with the other exhibits herewith returned.

In table marked as Exhibit 34, prepared by Mr. Moxey, he shows that, taking the books of the respondent as true as to all of the amounts expended, but making certain corrections for erroneous charges set out in the various tables prepared by him, and which he found from the books themselves to be erroneous, he arrives at the result that the cost of producing telephone service in the entire territory covered by respondent's plant, and including the state of Kansas, to be thirty-one dollars twenty-one cents ($31.21) per 'phone for the year 1900. This includes, however, an average rental or royalty per 'phone of three dollars sixty cents ($3.60) paid to the American Bell Telephone Company, leaving the net cost per 'phone, exclusive of this rental or royalty, twenty-seven dollars sixty-one cents ($27.61).

For the year 1901 he finds the average cost per 'phone in the same territory, including the royalty, thirty-two dollars thirty seven cents ($32.37), or, deducting royalty paid, twenty-nine dollars thirteen cents ($29.13); and for the year 1902, he finds the average cost per 'phone, including royalty, twenty-eight dollars eighty-one cents ($28.81), or, deducting royalty, twenty-six dollars eighty-five cents ($26.85).

In the argument of this case, counsel for respondent have taken the position that these estimates made by Mr. Moxey, for the whole territory, are upon correct basis, except that it is claimed that included in this estimate for the year 1902 are telephones used by sub-licensees of the respondent, amounting in number on an average for that year of $3,500, and for that reason the divisor by which Mr. Moxey secured his average was too large by 3,500, and the quotient correspondingly too small, because it is claimed by respondent that the 'phones used by sub-licensees of respondent were without expense in any amount to respondent. An examination of this table will show that the average number of sub-licensees' telephones included in respondent's system for 1902 was 2,625, and not 3,500. It is true that Mr. Ross, the witness introduced by the respondent, and who is shown to have had charge of the sub-licensee business of the respondent, did testify that, while respondent received an income from the sub-licensee for the 'phones furnished them, the respondent was at no expense whatever in furnishing or maintaining such 'phones. That this witness is in error in that respect, I find demonstrated from respondent's books.

Table No. 36, prepared by Mr. Moxey, shows that sub-licensees' 'phones were carried on the books of respondent only from November of 1901.

Beginning in 1901, and running through 1902, are found specific items of charge by way of expense under maintenance account, entitled "Sub-License," found in Table No. 27, prepared by Mr. Moxey. Whether there were other such expenses included in the various items of Incidental or Traveling Expenses, and which might be properly chargeable to the Sub-License feature of this business, the evidence does not show.

If the number of sub-license telephones should not be considered in arriving at the average cost per 'phone, then it follows, necessarily, the expense clearly incurred because of these 'phones should also be eliminated in arriving at a proper average cost.

Figuring upon that basis the average cost per 'phone for 1902, including rental to the American Bell Telephone Company, would be thirty-one dollars ninety-three cents ($31.93), or, deducting this rental, it would be twenty-nine dollars ninety-seven cents ($29.97) per 'phone.

From the table prepared by Mr. Shelley, Exhibit 97, it will be seen that the average cost of operating respondent's plant during its entire history was an average of 20.01 per cent of the gross receipts. For the year 1901 the per cent was 20.83, and for the year 1900, it was 19.15 per cent, while for the year 1902, including more than three months of time following the passage of the ordinance upon which this action is based, the book expenses of operation appear to be 25.30 per cent, or greatly in excess of any other year of its history, except those of the first two years, 1882, for four months, and 1883, during which the per cents were twenty-eight and one-half (28½%), and twenty-seven (27), respectively.

The evidence to my mind discloses no facts sufficient to justify this great increase in expense in so far as the Kansas City offices are concerned, in view of the fact disclosed by the testimony of witnesses that the improved switchboards installed, and being installed, during 1901 and 1902, would reduce the operating expenses of respondent from fifteen to twenty per cent. If the operating expenses for 1902 should be stated at the average per cent disclosed for the entire history of respondent, then the average cost per 'phone for this year including rental to the Bell company would be $29.11, or, excluding this item, it would be $27.15 per 'phone.

In the number of 'phones shown upon the respondent's books, as reported by the witness, Moxey, are included, as I find, approximately nine hundred long-distance stations where to each 'phone is an average of about twenty-nine miles of wire and about seven miles of pole line.

Not only in the matter of operation, but in maintenance, as well, must the cost per 'phone be much higher for these 'phones than in respondent's Kansas City Exchange Territory.

In the matter of operation the cost must for these be much higher per 'phone than in Kansas City, for the reason that each of these long-distance stations must have one operator, while in Kansas City one operator handles about sixty-seven lines, serving on an average about one hundred subscribers or 'phones.

It is true that the evidence shows the cost of operation per 'phone in a large exchange like Kansas City, Missouri, is larger materially than in a small country town or village exchange.

I am of the opinion, however, that when the long-distance stations are taken into account along with the exchange stations in this telephone system, the cost of operation and maintenance per 'phone in Kansas City, Missouri, is not greater than the average cost per 'phone in the whole system.

Relator proved by several witnesses who testified as experts, and at least one from actual knowledge of the conditions, that the actual and necessary cost of producing first-class telephone service by respondent's plant at Kansas City, Missouri, with the number of 'phones it is shown to have in use, was from about twenty-three to twenty-five dollars per 'phone.

The respondent failed to produce a single witness who was in its employ, or who was shown to have knowledge of the actual conditions at Kansas City, by whom it undertook to prove the actual cost, either in the aggregate or per 'phone of producing telephone service either in said city or within the limits of its exchange territory there.

Upon this question respondent did introduce two witnesses, by one of whom—Mr. Lane—it undertook to prove the actual cost of producing telephone service in the city of Omaha, Nebraska, whose testimony on this question was objected to by relator on the ground that the figures which he gave were deductions made from the books of the Nebraska Telephone Company, and which deductions, or compilations, were made, not by the witness himself, but by clerks in his employ, which objection I have sustained, being of opinion that such evidence is hearsay and incompetent, and certainly not the best evidence.

The other witness introduced by the respondent upon this question was Mr. Field, who was treasurer of the Colorado Telephone Company. Each of these two last named companies, as shown by the evidence, are related to the Bell Telephone Company in the same manner as is respondent, and the evidence shows that the system of doing business and keeping books in these Bell companies is practically the same. This witness testified that the

actual cost of producing telephone service in the city of Denver, where the number of 'phones was only about nine thousand six hundred (9,600), was, for the year 1902, $40.70 per 'phone. This witness, among other things, testified to it being the custom of the said company at the beginning of the year to estimate and set apart for maintenance of its plant during that year, such amount as was thought would be sufficient to meet all requirements of maintaining the plant in good condition during that year. He testified that the cost of producing service for the year 1902 was lower than ordinary in that city, because their maintenance expenses there had been unusually light for that year.

Upon examination as to another feature he testified, however, for the maintenance of that plant that year they had not only spent all that had been set aside, or estimated for that purpose at the beginning of the year, but more.

In other respects I am persuaded the testimony of this witness should not be regarded as of great probative force, tending to establish what is the actual cost of producing telephone service in Kansas City, Missouri.

It is true, in my opinion, that some of the witnesses testifying for relator, in making their estimates as to the cost of producing service in Kansas City, Missouri, left out of consideration some things that are proper elements entering into such cost. If the actual cost of producing such service at Kansas City is, in fact, greater than it seems to me the evidence in the case shows it to be, it is unfortunate that respondent did not see fit to put upon the witness stand and prove by such witnesses persons connected with its service in Kansas City, who must, by virtue of their relation to the business there, know more about the actual facts than any other persons.

From the evidence, however, which was introduced in the case, I am of opinion, and find, that the actual, necessary cost of producing local telephone service in Kansas City, Missouri, including the cost of maintaining respondent's plant in good working condition, is not to exceed twenty-seven dollars ($27.00) per telephone, taking the plant as the evidence shows it now to be.

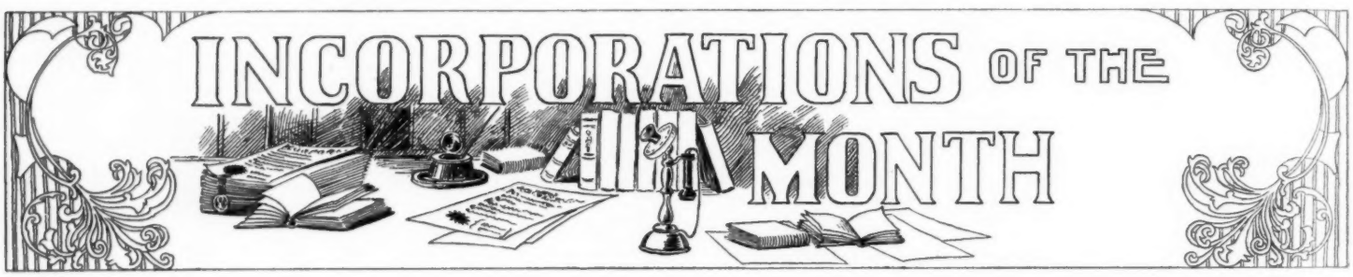
I am of opinion, and find further, that the percentage of depreciation which this plant will sustain from year to year within the limits of Kansas City, Missouri, with the maintenance as above stated, will not exceed six per cent per annum.

There is a large portion of the value of respondent's plant consisting of real estate and underground or conduit construction in which the percentage of depreciation would be very low. In fact, the evidence tends to show that the value of the real estate is increasing rather than decreasing.

I am, therefore, of opinion that respondent's telephone exchange, with the number and character of subscribers shown by the testimony, can be operated and maintained at the rates prescribed in the ordinance upon which this action is founded, and from the proceeds arising from such service all of the expenses of operation and maintenance may be paid, the depreciation as above found be taken care of, and the stockholders paid an annual dividend of at least eight per cent on their shares of the issued capital stock of the company.

In the hearing of evidence and argument of counsel in the case, all of which was done at Kansas City, Missouri, and in the consideration of the evidence, as taken and preparation of my report, I have been engaged forty-eight days, and my personal expenses have been one hundred and seven dollars ($107).

All of which is most respectfully reported.



Cass County Telephone Company, Motley, Minn.

Columbia County Telephone Company, Benton, Pa.

Medford-Clinton Telephone Company, Medford Minn.

Willow City Telephone Company, Willow City, Texas.

The Lunenberg Telephone Company, Meherrin, Va., organized.

Interstate Telephone Company, Odon, Ind. Capital stock, $4,000.

Farmers' Telephone Company, Kumkle, Ohio. Capital stock, $5,000.

Vigilant Telephone Company, Dillonvale, Ohio. Capital stock, $3,000.

Farmers' Telephone Company, Hopedale, Ill. Capital stock, $5,000.

Citizens' Telephone Company, Delaware, Ohio. Capital stock, $50,000.

Mutual Telephone Company, Walnut Grove, Miss. Capital stock, $100,000.

Farmers' Telephone Company, Newport, Ark. Capital stock, $100,000.

Waxhaw Telephone Company, Waxaw, N. C., organized. Capital stock, $2,000.

Hunter Telephone Company, Hunter, N. D., organized. Capital stock, $5,000.

Butler County Telephone Company, Allison, Iowa. Capital stock, $10,000.

Whitewater Telephone Company, Whitewater, Kan. Capital stock, $25,000.

Archer-Primghar-Philby Rural Telephone Company, Primghar, Ia., organized.

Union Telephone and Telegraph Company, Keokuk, Ia. Capital stock, $1,500,000.

City and Suburban Telephone Company, Johnstown, Pa. Capital stock, $50,000.

Munith and Grass Lake Telephone Company, Munith, Mich. Capital stock, $2,500.

Lightsville Telephone Company, Lightsville, Ohio, organized. Capital stock, $5,000.

Sunday Creek Valley Telephone Company, New Lexington, Ohio. Capital stock, $50,000.

Putnam Mutual Telephone Company, Unionville, Mo., organized. Capital stock, $10,000.

Mutual Telephone Company, Walnut Grove, Tenn., organized. Capital stock, $100,000.

Charles Mix County Telephone Company, Platte, S. D., organized. Capital stock, $5,000.

South Lyon Telephone Company, South Lyon, Mich., organized. President, Kingsley Calkins.

Lawrence County Telephone Company, Black Rock, Ark., organized by F. W. Tucker and others.

Summit Rural Telephone Company, Council Bluffs, Ia. Incorporators: J. C. Geister and others.

Citizens' Telephone Company, Coshocton, N. Y. Capital stock, $50,000. Manager, L. P. Gallagher.

Farmers' Mutual Telephone Company of Whitley County, Columbia City, Ind., organized. Capital stock, $25,000.

What Cheer Telephone Company, What Cheer, Iowa. Incorporators: E. R. Hatcher, J. T. Suouffer and others.

Pitcher Telephone Company, Warren, Ill. Capital stock, $7,500. Incorporators: James Bayne, W. Ford, L. D. Pitcher.

Troy Telephone Company, Troy, N. C. Capital stock, $100,000. Incorporators, J. R. Blair, O. M. Wafe and W. A. Cochran.

Cokato Telephone Company, Cokato, Minn. Capital stock, $10,000. President, A. P. Peterson; secretary, C. R. Peterson.

Kellogg Mutual Telephone Company, Kellogg, Ia. President, J. C. Craven; secretary, J. W. Reimer; treasurer, C. J. Irish.

Elma Telephone Exchange, Elma, N. Y. Capital stock, $5,000. Incorporators are Herman Jude, R. Peter and H. B. Lee.

Alexis Telephone Company, Alexis, Ill. Capital stock $2,000. Incorporators: Chas. Rogers, J. W. Standley, W. A. McKnight.

Traverse Bay Telephone Company, Central Lake, Mich. Weilsburg Telephone Company, Toledo, Ohio. Capital stock, $50,000.

Ollie National Telephone Company, Ollie, Ia. President, J. J. Terrill; secretary, Dr. Chas. McKinnis; treasurer, Frank Marshall.

Whitesburg Telephone Company, Whitesburg, Ky. Capital stock, $4,000. Incorporators: John B. Lewis, D. D. Fields, John W. Collins.

Farmers' Lake Shore Telephone, Traction and Electric Power Company, Algoma, Wis. Capital stock, $3,000. Incorporators, H. J.

Teske, C. L. Fellous, O. C. Rye, Dave Hitt and William H. Fellows.

Farmers' Mutual Telephone Company, Hart, Minn. President, Ben Kauphusman; secretary, Julius Jacobson; treasurer, Geo. Degman.

Clarinda and Shambaugh Telephone Company, Clarinda, Ia. Capital stock, $2,000. S. R. Turner, president; D. D. McCally, secretary.

Port Wing Telephone Company, Port Wing, Wis. Capital stock, $5,000. Incorporators: Axel L. Johnson, Carl Hogfeldt, S. Swanson Ogden.

St. Croix Valley Telephone Company, River Falls, Wis. Capital stock, $12,000. Directors: J. L. Chatman, J. A. Chinnock and J. Bailey.

Farmers and Mechanics' Telephone Company, Newhall, Ia. Capital stock, $1,000. President James Harrington; secretary, F. G. Byrner.

Adams County Telephone Company, Peebles, Ohio. Capital stock, $10,000. Incorporators: E. Humphreys, John Blair, O. F. Thomas.

Maiden Rock Telephone Company, Maiden Rock, Wis. President, Beverly White; secretary, Otto Holverson; treasurer, G. Baugton.

Farmers' Mutual Telephone Company, Chandler, Okla., organized. President, L. L. Brown; secretary, Geo. Davis; treasurer, H. P. Pomeroy.

Hickman County Telephone Company, Hickman, Ky. Capital stock, $5,000. Incorporators, Thomas Emerson, B. A. Boone, J. R. Scarbrough.

Otley Telephone Company, Otley, Ia. Capital stock, $5,000.

The Canada Creek Telephone Company, Fremont, Ky. Capital stock, $5,000.

St. Louis County Telephone Company, St. Louis, Mo., organized. Capital stock, $10,000. President, J. B. C. Lufas; secretary, D. C. Taylor.

Lamont and Eddy Rural Telephone Company, Lamont, Okla. Capital stock, $312. Incorporators: John S. Cowan, Art Hollopeter and Swan Olson.

Homer Telephone Company, Homer, Mich. Capital stock, $15,000. Stockholders: B. F. Woodbury, R. C. Smith, R. D. Gardner, E. D. Woodbury.

Eastern Illinois Telephone Company, Jersey City, N. J. Capital stock, $500,000. Incorporators: Charles N. King, Le Grand Bouker, and F. M. Green.

Dublin Telephone and Manufacturing Company, Macon, Ga. Capital stock, $100,000. Incorporators: A., N. M., I. and Samuel Block and M. Jones.

Monroe County Mutual Telephone Company, Paris, Mo. Capital stock, $4,500. Incorporators: W. Jones, W. S. Wiley, J. M. Griggsley and others.

Valley Telephone and Telegraph Company, Green Bay, Wis., organized. President, W. E. Fairchild; secretary, H. H. Davenport; treasurer, W. H. Jones.

Blackwell Rural Telephone Company, Blackwell, Mo. Capital stock, $25,000. Incorporators: W. Harshman, William Risley, C. E. Fondrey, A. Durand.

Milo Telephone Company, Milo Center, N. Y., organized. Capital stock, $5,000. President, A. Castner Townsend; secretary-treasurer, John W. Coolbaugh.

Milo Telephone Company, Milo, Ia. Capital stock, $3,000. Incorporators: R. B. McClelland, E. J. Burgess, J. E. Clayton, Lewis Shaffer and O. T. Winning.

St. Louis County Telephone Company, Clayton, Mo. Capital stock, $1,000. Directors, H. J. Weber, J. B. C. Lucas, J. Kessler, Ernest Marshall and others.

Clinton Telephone Company, Plattsburg, N. Y. Capital stock, $50,000. Incorporators: Jas. G. Edwards, Charles B. Knox, Edward S. Parkhurst, John M. Wever.

McKee-Booneville Telephone and Telegraph Company, McKee, Ky. Capital stock, $3,000. Incorporators: A. P. Gabbard, W. F. Welch and H. C. Fowler of McKee.

Rural Home Telephone Company, Owensboro, Ky. Capital stock, $25,000. Incorporators: H. K. Cole, J. K. Woodruff, Owensboro, and F. A. Lundquist, Chicago.

Benson County Telephone Company, Maddock, N. D. Capital stock, $5,000. President, A. W. Engel; vice-president, A. M. Sheimo; secretary and treasurer, P. J. Moen.

United Farmers' Telephone Company, Wapakoneta, Ohio, organized. President, R. A. Kerr; vice-president, M. Lavison; secretary, J. N. Graham; treasurer, C. C. Creps.

Audubon County Telephone Company, Audubon, Ia. Capital stock, $15,000. Incorporators, J. N. Manarg, S. M. Luse, J. P. Keith, John Nailor and J. L. Nedrow.

Morning Sun Telephone Company, Morning Sun, Ohio. Capital stock, $10,000. Incorporators: R. H. Douglas, W. N. Cook, J. R. McCrory, S. H. Paxton and H. Weed.

Southern Berkshire Telephone Company, Great Barrington, Mass., organized. President, Roscoe E. Taft; treasurer, Clarence E. Culver; clerk, H. Mayhew Whiting.

Mt. Pleasant Telephone Company, Mt. Pleasant, S. C. Capital stock, $2,500. Incorporators: O. A. Hamlin, O. H. Patjens, Ed Fincken, W. D. Hamlin and Lee Royal.

Lewiston Telephone Exchange, Lewiston, Minn. Capital stock, $10,000. Incorporators: John Gaffney, Henry E. Wirt, Peter C. Daley, B. S. Blanchard, M. A. Williams.

Yeoman Telephone Company, Yeoman, Ind. - Capital stock, $1,000. Directors: Wm. McNeel, G. W. Steele, Israel German, M. M. Baum, Wilber Creek and G. H. Birney.

Verdigris Telephone Company, Verdigris, Neb., organized. Capital stock, $1,600. President, Emil Schlem; vice-president, J. B. Bates; secretary and treasurer, B. Stevenson.

Schoolcraft Telephone Company, Schoolcraft, Mich., organized. Directors: C. C. Duncan, D. J. Munn, F. M. Smith, R. E. Berney, John Gilchrist, W. R. Blodgett, C. W. Krum.

Greenfield Home Telephone Company, Greenfield, Ohio. Capital stock, $30,000. Incorporators: Fay Baldwin, Stewart Bodin, Aaron Head, C. E. Henry, D. C. Miller, Stanley Pike.

Summit Rural Telephone Company, Akron, Ohio, organized. Capital stock, $3,000. Incorporators, E. A. Hopkins, W. F. and Grace F. Laubach, H. E. Spicer, J. O. Harkins.

The Home Telephone Company, Concord, Mo. Capital stock, $10,000. Incorporators: Henry Goebel, C. D. Balyess, C. A. Wilday, H. L. Deppe, L. L. Rexroot and H. W. Diggins.

Portsmouth Telephone Company, Portsmouth, Iowa. Capital stock, $10,000. President, Gus Batty; vice-president, Peter Korth; secretary, W. A. Sorrenson; treasurer, C. S. Scroggins.

Brockport Telephone Company, Brockport, N. Y. Capital stock, $10,000. Directors: Frank A., A. P. and G. L. Winne, James Brenman, Thomas H. Dobson, Mary E. Talman and James Conley.

Louisville, Hoosier, Bible Grove and Ingraham Telephone Company, Hoosier, Ill., organized. President, W. A. Harmon; vice-president, John L. McKnight; secretary and treasurer, Joseph Erwin.

Home Independent Telephone Company, Filley, Neb. Capital stock, $3,000. Incorporators: Chas. Hughes, president; J. A. Barnard, secretary; C. A. Burbank, treasurer; S. R. Smith and Ed Hughes.

U. S. Telephone and Telegraph Company, Waterloo, Ia. Capital stock, $1,000,000. Incorporators: T. K. Elliott, president; Jas. Gardiner, vice-president; L. H. Bowham, secretary, and C. E. Pickett.

American Telephone and Telegraph Company of New Jersey, Trenton, N. J. Capital stock, $130,000. President, E. J. Hall; secretary, Melville Egleston, Elizabethtown; treasurer, Jas. C. Vail, New York.

Mountain Grove Telephone Company, Mountain Grove, Mo., organized. Capital stock, $10,000. Directors: E. H. Farnsworth, W. S. Candler, L. H. Slaughter, Mountain Grove; L. M. Fenner, Buckhart; B. V. Morris, Rockbridge.

Thomas Telephone Company, Thomas, Okla. Capital stock, $10,000. Incorporators: R. A. Smith, F. T. Crowley, J. E. and O. Zimmerman, Lawson, Mo.; D. L. Kinser, Holt, Mo.; J. T. Riley, Liberty, Mo.; C. P. Mitchell, Thomas, Okla.

Beaver County Telephone Company, Beaver, Pa. Capital stock, $100,000. President, James G. Mitchell, Rochester; vice-president, Joseph F. Mitchell, New Brighton; treasurer, Frank F. Brierly, Beaver Falls; secretary, Robt. W. Darragh, Beaver.

Central Construction Company, Little Rock, Ark. Capital stock, $500,000. Directors: W. R. Abbott, F. A. Mollitor, Ft. Smith, Ark.; J. M. Spaulding, Greenfield, Ark.; J. W. McLoud and Willard Johnston, of Little Rock; C. M. Cade, of Shawnee, and R. H. Drennan, of Oklahoma City, Okla.

Farmers and country residents, remote from a postoffice, who have telephones or look forward to the time when they can afford this modern convenience, will be interested in the efforts of the national congress to make the telephone an arm of the postoffice department. The bill that was introduced to appropriate $25,000 for what is termed an "experimental rural telephone free delivery," provides that when anyone places a special postal stamp on a letter, the postmaster at the postoffice to which it is sent, will be authorized to open the envelope and transmit by telephone the contents of the letter to the person in the country to whom it is addressed.

Detroit Independent Telephone History

FREDERICK A. WEGNER

In the waning years of monopoly under the Bell company, Detroit, because of the high handed methods of that company, was ready for some relief if it could be had. Because of its importance as a strategic point, promoters early turned their eyes toward that city, but knew that as long as the Bell was so solidly entrenched, with patents yet valid, little could be hoped for. There was a company at that time (1885) operating in Chicago known as the Harrison Telephone Company, manufacturing a telephone and transmitter purporting to be the invention of Dr. Harrison. Connected with this company was Count Mitzkovitz, H. J. Hanford, and the late R. A. Brett. During the fall of 1894, Mr. Brett came over from Chicago and opened an office on State street, and began the active work of soliciting subscribers for a new telephone system. By July 3, 1895, he had proceeded so far that the Detroit Harrison Telephone Company was organized, a plant having been put in at Port Huron in the meantime. Incorporators were O. W. Shipman, Charles P. Collins, R. A. Brett, Albert Pack, Collins B. Hubbard, Frank D. Andrus, William L. Holmes, and Charles Flowers; with the exception of Mr. Brett, all were representative Detroit business men. The preliminary work had progressed to a point where an energetic leader was required to push the work started. The person who came to Detroit and assumed this leadership was H. T. Hanford, who came from Chicago and assumed the active management of the new Detroit Harrison Telephone Company.

The exchange was built, but the apparatus was poor. The transmiters were pencil carbons, with a diaphragm and carbon point on same. The switchboard that came back after being thrown out of the exchange at Port Huron was roped together and clumsy and awkward drops were wired so as to keep them from falling apart.

The Harrison people had nothing except a telephone instrument. They had no switchboard, terminal, intermediate, cross-connection board or any of the accessories so essential to modern exchange construction, but they nevertheless bravely went to work.

The Toledo, Ohio, exchange, shortly after its construction work was completed went into the hands of a receiver; also a number of the other exchanges they had built, mostly because of defective apparatus. Had the Harrison Manufacturing Company foreseen its position or dreamed of the possibilities of the telephone, and taken time by the forelock, and installed first class work, it would have been a factor in telephony to-day. It was the first Independent in the field and was making money.

The Detroit company began buying its telephones from a large manufacturing company in the East, but after buying and installing some five thousand telephones decided to organize a manufacturing company. The company's repair department was gradually enlarged, new machinery was installed, and the work grew surprisingly under the able supervision of a young mechanical engineer; then the manufacture of switchboards and kindred apparatus was begun. The work proved so profitable for the company that the "Detroit Switchboard and Telephone Construction Company" shortly after being organized filed a notice in the county clerk's office of an increase in capital stock from $100,000 to $250,000. Most of the men composing the telephone company also being stockholders, officers and directors in the manufacturing company.

Previous to the organization of the manufacturing company there was organized what was called the "New State Telephone Company," to develop the state of Michigan. I have before me a copy of an advertisement that appeared regularly at that time. "You can now talk to the following named places at these low rates," giving 145 toll stations and the rates. The lowest was ten cents and the highest forty-five cents, between which varying prices prevailed.

About this time the New State Telephone Company bought 225 miles of toll system between Grand Rapids and Lansing, with branches extending to Ionia on the north and Nashville, Mich., on the south, making it at that time one of the largest Independent systems in the United States. It expected to girdle the state and push into southern Michigan territory. This deal went a long way towards placing it in a strong position in the state; the system had been under the control of the Co-operative Telephone Company of Lake Odessa. This Co-operative Telephone Company had made very little effort in the way of building exchanges, but built many toll lines. Its exchanges were in Lake Odessa and Grand Lodge, and its toll lines extended and connected with exchanges at Grand Rapids and Lansing. It had started several years before in a small way and since that time had pushed lines southeast by the way of Woodbury, Sunfield and Grand Lodge to Lansing. Going north the line touched Clarksville, Elmdale and other small towns on the direct line to Grand Rapids. Then a line was built a short way out of Grand Rapids and striking southeast landed at Ionia, Howell being the most important town en route. Next a twenty-five-mile line was completed from Lake Odessa to Nashville; then Woodland seven miles northwest of Woodbury was also connected.

This purchase gave the New State Telephone Company entrance into Ionia, Lansing and Grand Rapids and it was a most important factor in the system. Of the lines then completed or projected, the most important was the one reaching out to the southwest by way of Monroe for Adrian on the one hand and Toledo on the other. At Adrian a large Independent exchange was in full operation and was connected with the Detroit exchange a few weeks later on. President Holmes at that time gave out the information that as soon as the local Independent company at Toledo had its exchange in such shape that they could make use of the toll lines into Michigan a line would be built to that city.

On the north there was a line of twenty-two miles completed to Mt. Clements, and an Independent exchange was built in that town. The terminal of this line was Port Huron, with one system of wires reaching out by the lake shore and touching Algonac, Marine City, St. Clair and Port Huron. Another line was being built from Mt. Clemens, and was intended to strike inshore to Richmond and then turn into Marine City on a sharp angle, there joining the main line into Port Huron. There was under construction another toll line that was expected to be an important factor for the company. It was a line twenty-eight miles long from Detroit to Ypsilanti, with a ten-mile projection to reach Ann Arbor. The New State company already had a flourishing exchange at Ypsilanti.

It will be readily seen that aside from the value of all these lines to the New State Telephone Company, their advantage and value to the Detroit Telephone Company was greater. The two companies were largely officered by the same men, as stated above, and, of course, the welfare of each was the concern of both companies. Every line that had been purchased, or was to be purchased, erected, or has been projected, carried in the contracts a traffic agreement

with the Detroit Telephone Company, which would not only furnish it with a large amount of business, but would (and did) furnish a very large and constantly increasing source of revenue for the parent company.

The line to Rockwood and Monroe was to take in Ecorse, Wyandotte and Grosse Isle. The line from Monroe to Adrian was to go by way of Petersburg to Dundee and Blissfield. The line southwest to Ann Arbor included Dearborn and Wayne, and was, as soon as possible, to be pushed on to Jackson, Albion, Marshall, Battle Creek and Kalamazoo. The New State company was also building a copper metallic line to Pontiac through Royal Oak and Birmingham. This line was extended west through the towns on the Detroit, Grand Haven and Milwaukee railroad, and north through Oxford and Lapeer. Another line was being built west from Mt. Clemens to Romeo, through Davis and Washington. From Wayne the new line to Lansing was being completed by way of Plymouth, Northville, South Lyon and Howell, ultimately going into Grand Rapids. At Lansing the Lansing Telephone Company had an exchange in full operation, while the Grand Rapids Citizens' Telephone Company operated a large Independent exchange at that place. Poles had already been set all the way to Port Huron and Mt. Clemens, and but a short time longer sufficed to string wires on them and connect with the exchange at Port Huron. The loop from Mt. Clemens, on the short line to Marine City, ran by the way of Algonac and New Baltimore, and was intended to ultimately cover all the shore resorts, including the "Flats." At Monroe the new company had over 100 telephones in operation, and was building an exchange at Battle Creek, where it had over 300 subscribers.

At this time the Detroit Telephone Company had the largest Independent plant in existence in this country, both in number of subscribers (5,633) and the size of its operating switchboard, which covered the top floor of a large office building. Grand Rapids had the next largest.

From other miscellaneous sources, have before me data showing that about this time a connecting link had just been made by the New State Telephone Company between Bassett's Corners and Detroit, having then just finished (Oct. 11, 1897), setting the last pole there for a line to connect with its main line from Pontiac to Detroit. There was a gap in the telephone line between Franklin and Farmington, which was to be filled in by private enterprise or by the New State Telephone Company.

After waiting two years, Flushing with Flint were connected, thus providing a metallic line to Detroit and other places. The New State Telephone Company had contracted to furnish Owosso with an exchange and extend the service to Fenton. At Lapeer, F. A. Smart of the New State Telephone Company had secured orders for nearly 100 telephones; the line was to be built in May. At Hastings, Mich., the New State Telephone Company had been granted a right of way by the city council; it had a very large city exchange. The system was now being extended to the farmers, Detroit at that time having 5,633 contracts for telephones, while the Bell Company, not being so specific as to numbers, claimed to be taking new contracts at the rate of about twenty per day.

The Detroit Telephone Company had established eastern and western exchanges in the city, and new switchboards were ordered. It was predicted that within two years there would be not less than 10,000 Independent subscribers in Detroit.

At a meeting of doctors and druggists it was decided to form an association, and a proposition was made to the Detroit Telephone Company. They didn't want to pay for two telephones and all agreed to use one only. At a meeting held, W. L. Holmes, as president of the Detroit Telephone Company, was petitioned by a joint committee of the medical and pharmaceutical societies of Detroit for special rates, guaranteeing the exclusive use of the Detroit telephone by the members of both organizations. F. A. Cooke of the Pharmaceutical Society said the proposition was that the druggists and physicians should all use Detroit telephones, but there was no intention to restrict any one to the use of one if he desired both systems.

The proposition, which seems to have arisen entirely with the physicians, was regarded as a severe blow to the interests of the Bell company.

President Holmes took the proposition of the doctors and druggists under advisement and submitted it to the board of directors.

In some cities the companies give doctors a classification different from the merchants and business men. President Holmes told the committee that he was disposed to consider the proposition of the doctors favorably, but that the company could not possibly make a reduction to the drug stores. As he understood it, they proposed to use the Detroit telephone exclusively. The reason why so many doctors favored the Detroit company was that many of them had the new telephone. Of the 290 physicians who then used the Bell telephone, there were, according to the Detroit company, but sixty-six who did not use the new telephone. It was stated that the new directory which the Detroit company proposed to issue that over 500 of the 5,000 names in that book would be those of physicians. In regard to the proposition of the physicians to use the Detroit telephone exclusively, Mr. Holmes gave out the statement that at a meeting of the company it was decided that the telephone company had no authority, under the ordinance, to make special rates to any individual or class of individuals, so that disposed of the question.

The Detroit company being very prosperous, its officers set about for new worlds to conquer, so an immense telephone deal was planned, which was to be no less a project than an Independent exchange for New York, with 50,000 telephones, requiring an expenditure of $15,000,000. The Detroit company's apparatus was to be used, and it was rumored that the Western Union Telegraph Company was in the scheme, which was neither affirmed nor denied by the officials.

President Holmes and Treasurer Edward Parker of the Detroit company made a visit to New York, and upon their return it was explained that a party of New York capitalists were planning to organize an Independent telephone company and build an exchange of 50,000 subscribers. Negotiations were pending between some of the most prominent capitalists of New York and the Detroit company for the use of the apparatus of the latter concern for an exchange in Greater New York. The contemplated deal would have been a great thing for the Detroit Telephone Company, for it meant that its success in operating successfully a large exchange had attracted the attention of eastern capitalists, and that they had decided to try it in New York. Heretofore no Independent company had been able to get a switchboard large enough for such a city.

It was claimed the promoters of the New York company were prepared to invest $15,000,000 at once in a 50,000 exchange for Greater New York, and they expected to add very largely to that number later. Their plan contemplated the establishment of local stations and toll lines in every city of the Empire state.

Mr. Holmes could not, he said, without betraying confidence, give the names of the big capitalists interested in the deal, but declared they meant business. He would not say, however, whether any of them had been to Detroit to inspect the exchange.

This enormous dream of commercial conquest never was realized. The old switchboard put in the Detroit exchange was not suitable for the work and was constantly being changed, wires cut out, new circuits designed and different apparatus placed in the board. All this time the engineers

of the Detroit Telephone and Switchboard Company were figuring on a new board and in the fall of 1898 applied for a patent, which was granted.

New Orleans was trying to get relief from the Bell and had given a franchise to some New York people for an Independent telephone plant. The Detroit Telephone Company bought the franchise, sent its engineers and business men to look the ground over. The People's Telephone Company of New Orleans was organized with a capital stock of $600,000, and William L. Holmes of Detroit was elected president; William P. Curtis, vice-president and general manager; H. P. Walmsley, treasurer, and H. C. Gage, secretary. The work which had been interrupted by the city at that time was again resumed. T. F. Ahern was the general superintendent and he began at once planting poles outside of the conduit limits; the cable and wire being enroute.

The Detroit Telephone and Switchboard Construction Company secured the contract for a 5,000-telephone exchange at New Orleans and were to begin the construction work Sept. 1, 1898.

Up to the time of the Detroit capitalists' coming into New Orleans, there was no competition, because the opposition to the Bell company lines had been unable to complete its underground system. The fact that the new Independent company was installing what promised to be a complete system, at a low rate to subscribers, had the effect of lowering the Bell rates. Up to 1897 the telephone charges in New Orleans reached almost the limit charged in any city, where there was no competition, but as it anticipated the advent of opposition, the old organization cut its rates to $3.00 per month for business houses and $2.50 for private residences. The work of placing telephone wires was progressing favorably, and the management of the new Independent company said that it was likely it would be able to give a complete modern service by May 1. It was expected that the new rates of the old company would have to be reduced to meet the opposition of the new concern whose management claimed that they would give a perfect service.

There were now four large Independent telephone companies—the Detroit Telephone Company, the parent concern; the New State Telephone Company, operating toll lines and exchanges in Michigan; the Detroit Telephone and Switchboard Construction Company, the manufacturing end of the combination, and, lastly, the People's Telephone Company of New Orleans, all having grown from the original Harrison Telephone Company, as promoted by Messrs. Brett and Hanford.

The handling of this vast amount of business, which had from only a few telephones grown into companies of vast proportions, required considerable capital, as the four companies represented at a conservative estimate a cash outlay of two millions of dollars.

The Erie Telephone and Telegraph Company finally bought the three northern companies, while the People's Telephone Company was sold to the Cumberland Telephone and Telegraph Company. As near as could be learned $4,000,000 cash changed hands in this deal, and President William L. Holmes is popularly supposed to have made a clear profit of about $1,000,000 in the transaction, being the prime mover in everything in connection therewith and also being one of the heaviest stockholders.

The first news the people of New Orleans had of any combine was a story to the effect that the People's was to be absorbed. The local directors were unable to confirm or deny the report, and sent Manager Curtis to Detroit for information.

Telegrams were received in New Orleans about Jan. 28, 1899, from Louisville, intimating that the People's Telephone Company had been absorbed by the Cumberland. No details of the conditions under which the alleged amalgamation had taken place were contained in these dispatches, but as the Cumberland directors had held an important meeting in Louisville on Friday and absorbed the Ohio Valley Telephone Company and were said to have been given control of wires from New Orleans to Cairo, some color was attached to the story.

At the offices of the People's company, it was said that so far as the directors were concerned, there was no information to confirm the news from Louisville. As was well known, Detroit capital was largely invested in the local company, and while recently re-elected directors were mainly New Orleans people, the majority of the stock was in the control of the Detroit Telephone and Switchboard Construction Company.

While the New Orleans interests in the People's Telephone Company were unable to say what the Detroit people may have done or intended to do with their stock, those interests were known to be firmly opposed to any consolidation, and the absorption of the new exchange could only be effected by the determination of the outside stockholders to dispose of their stock to the Cumberland company.

It was assured that if the absorption was finally consummated that it would be only with the reservation that the subscribers of the people's should be amply protected, their service maintained at its present high state of perfection and the charges to them limited for a period of years to those which prevailed there during 1899.

The entrance of that Independent company into the field had resulted in the institution of a telephone service second to none in the country at that time, and, without the keen competition, it might have been many years before New Orleans would have had the elaborate modern improvements in telephoning that has been furnished in the last few years. Beyond the improvements of the service competition had compelled a reduction of more than fifty per cent in telephone charges, and made it plain to the public that an up-to-date service could be given at prices much lower than those which formerly prevailed. President W. L. Holmes and other stockholders refused to talk about the sale of the People's Telephone Company, but the following could be depended upon as the truth:

For six months previous to the sale the Detroit stockholders had been considering an offer from the Cumberland Telephone and Telegraph Company for their New Orleans interests. G. M. Caldwell of the Cumberland company went to Detroit and made an offer, but too high a price was asked. Mr. Caldwell considered the figures and went to Detroit a second time, when a compromise was affected and the deal made. It was impossible at that time to find out the price paid.

The deal was made about the same time the Erie system bought the Detroit and other companies, which caused a great deal of indignation among the smaller stockholders, and which was expected would ultimately result in the pooling of issues and a lawsuit.

The People's Telephone Company was really a Detroit concern, as five-sixths of the bonds and stock were held in that city, and only one-sixth of the interest was held in New Orleans.

When the People's company was launched and secured its franchises, the promoters tried to raise the money to build the plant in New Orleans, but failed. Then they went to Detroit and interested the Detroit Switchboard people, who, after looking over the field, readily consented to put in the capital for the construction. They carried out their part of the agreement, receiving bonds and stock representing their investment.

The result was that about $300,000 of outside capital was brought into New Orleans and considerable work was provided for local labor. Some months previous the Detroit people desired to dispose of their holdings and sent three representatives to sell bonds and stock. They did extensive advertising, it was claimed expending about three thousand dollars in this direction, and tried to interest local capitalists,

but only succeeded in disposing of one $1,000 bond. That demonstrated the financial condition among the public-spirited citizens of New Orleans.

When the sale of the Detroit company was made it was expressly stipulated that for a period of twenty-five years the service was to be maintained at the standard it had reached at the time of the sale, and that rates would not be increased.

In its brief history the People's company achieved a great deal. It cut rates fully fifty per cent, put in an excellent plant, and gave good service. It was making eight per cent on the investment and had introduced a number of improvements in the service unknown in that city prior to its establishment.

In the second paper, which will appear in the November TELEPHONY, the Detroit Independent telephone history will be brought down to date.

THE FINANCIAL SIDE OF INDEPENDENT TELEPHONY.

In some interesting figures on the growth of the use of the telephone in the United States in a recent editorial in TELEPHONY entitled "Golden Opportunities for Earnest Workers," it is stated that at the end of the year (1902) there were 6,511 telephone exchanges, of which 2,811 were Bell and 3,700 Independent, operating 2,850,000 telephones, of which 1,500,000 were Bell and 1,350,000 Independent, and requiring the services of 79,436 persons, of which the Bell companies employ 40,864 and the Independent 38,572.

People who have studied the financial side of the telephone industry are united in the opinion that nowhere in the range of new business venture are the possibilities of quick and large money returns as in the Independent telephone field. During the few years in which telephone corporations other than that the Bell have established lines, exchanges and other visible properties necessary to telephone systems, it has been so manifest as to preclude contradiction that in all cases where the business has been properly managed, the dividends paid have been eminently satisfactory.

To illustrate, in the small town of Carey, Ohio, two bankers, thoroughgoing men of business, own and operate an Independent telephone company. This company has only about six hundred subscribers, yet the enterprise to-day is paying the owners a dividend of 12 per cent annually. Again, a number of years ago, a boy, some fourteen years old, applied for and got the work of carting into the cellar of a certain bank building of a small Ohio town, a load of coal. This was the boy's first connection with the bank. To-day he owns the bank building and is chief executive of the bank. Three or four years ago this capable young business man invested $125 in an Independent telephone company. Since then he has invested enough more to make the total $7,000. For his interest in this telephone enterprise he was recently offered $50,000. Illustrations such as these might be multiplied many times.

In Ohio about 80 per cent of the aggregate investments in telephone enterprises are in the Independent companies, and in Michigan the Independent companies and the Bell company divide the field about evenly. In Indiana the Independent telephone interests are stronger than the Bell. The bankers of Indiana are greatly interested in Independent telephone propositions and are invested in them largely.

The Bell company regards the city of Pittsburg and its environs as second only to New York city as a profitable field. It is interesting to note, therefore, the practical proof of this belief afforded by the Pittsburg rival of the Bell company. The Pittsburg and Allegheny Telephone Company has proved itself strong and aggressive, and already, though only in operation a little over a year, more than 10,000 subscribers connected with this system, with many more applicants on the waiting list.

The competition created by the Pittsburg and Allegheny Company is by no means confined to the local service. The Independent Telephone Company is giving excellent telephone service to substantially all points in Ohio and northwestern Pennsylvania, and even into the southwestern part of New York. Lines are being added to Wheeling, where they will connect with the National Telephone Company of that city; to Johnstown, Pa., where there is a modern and thriving plant; to Butler and Kittanning, and thence to Buffalo, where an unusually fine plant is under construction. From Buffalo an extension will be made to Rochester, where a prosperous company of about three years' standing is in operation. The Pittsburg and Allegheny company asserts that in all the places named it outnumbers the Bell company in subscribers nearly two to one. The Independent company reports earnings on its present long-distance system as increasing at the rate of nearly 30 per cent a month. It will be exceedingly interesting to note the still further growth and perfection of this meritorious enterprise.—*Money, Pittsburg.*

THE TRUE DEVELOPMENT OF THE TELEPHONE.

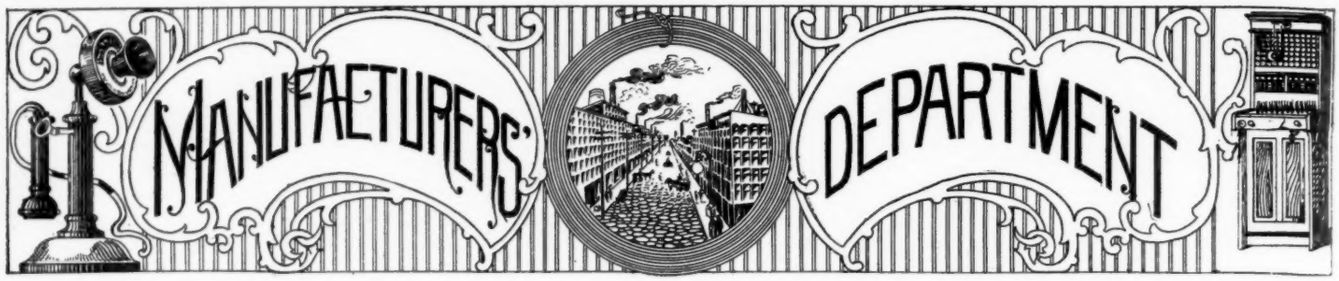
The Bell licensee companies throughout the United States, through an arrangement with the parent company, enjoyed a monopoly of the telephone operating business for nearly twenty years, and until the advent of the Independent companies it seemed to be the Bell motto to get as much money for its service as possible and to give for this money as poor service as the subscribers would stand. The Bell was never accused of philanthrophy, the idea of doing the greatest good to the greatest number was not Bell practice. Its plan was to "*do* the greatest number for its own good," and it was this policy of the Bell that made the telephone a luxury for the few. The true development of the telephone is being brought about through competition, regardless of the erroneous Bell contention of "natural monopoly." In the last five years the Independents have placed more telephones in service than has the Bell company in the last twenty-five years. While the Bell confined its operations to the large cities and the more populous sections, the Independents built in all sections and for all classes of people. At the rates inaugurated by the opposition the telephone was brought within the reach of all, and the people were not slow to take advantage of this modern time-saving, distance-annihilating instrument. To the greed of the Bell company is due the former limited used of the telephone, and had its unjust monopoly been continued, it is safe to say there would not have been more than two million telephones in service in this country, whereas there are about five million telephones in use, of which number three-fifths have been put in by Independents, who have brought about the true development of the telephone.

THE BELL LESSON OF HOW NOT TO TREAT THE FARMER.

The "farmer problem" is confronting every Independent exchange to-day. It was regarded first as a menace; it is coming in these later days to be regarded as the future hope of Independent telephony.

The Bell company, in its brilliant campaign for dollars, overlooked, or rather scorned to see the hard-earned savings of the tiller of the soil. It was impossible during the Bell's lease of power, for a farmer to get telephone connections.

This has been one of the principal contributions to Bell failure and Independent success. It will be a greater factor as the years go by. The farmer offers the great market for the future development of Independent telephony. He must be appreciated and not condemned.



A NEW TELEPHONE.

All great enterprises have been marked by a spirit of improvement and constant progress toward perfection, and in no field has more been accomplished than in the improvement and perfecting of the telephone. So necessary is the telephone to all branches of commerce and society that an unusual amount of time, thought and money has been put into experiments tending to its improvement. The many inventions which have entered into its construction have, of course, been due to the efforts of many different workers, each one of whom has added his quota to the wonderful mechanism which enables us to distinguish not only the words, but the actual tones and inflections of the voice many

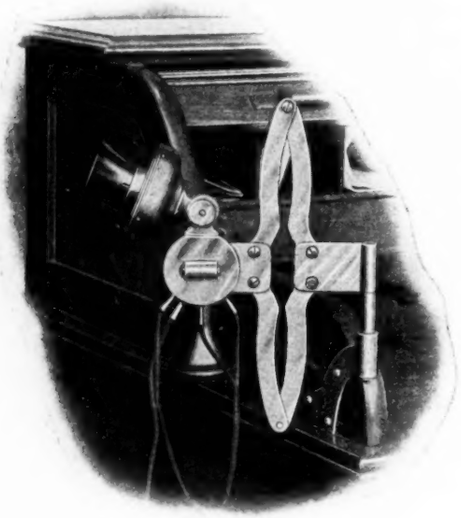


FIG. 3.

miles away. The majority of improvements tend to simplify existing apparatus, and the end and aim of the inventor is always to reduce even the smallest part to the simplest possible form.

The telephone instruments themselves—at least the wall type—switchboards, with their multiplicity of delicate parts, and even the insulators and lines for the outdoor portion of the equipment, have been the objects of unceasing efforts on the part of inventor and manufacturer, who have worked together to give subscribers the best service possible at a minimum of cost to the telephone company. Strange to say, little effort has heretofore been made to make any radical improvements on the desk instruments so familiar everywhere. Transmitters, receivers, ringers, protectors and all other necessary parts have come in for their share of changes, but the general style and plan of the desk set as a whole has remained unchanged. A telephone holder or desk bracket has for some time been recognized as a desirable and necessary adjunct to the desk instrument, and its use has proved an immeasurable boon, not only to the subscriber, owing to its great convenience, but to the company, on account of the wonderful saving in cost of maintaining these expensive instruments. With the advent of the telephone holder, broken mouthpieces, transmitters and cords

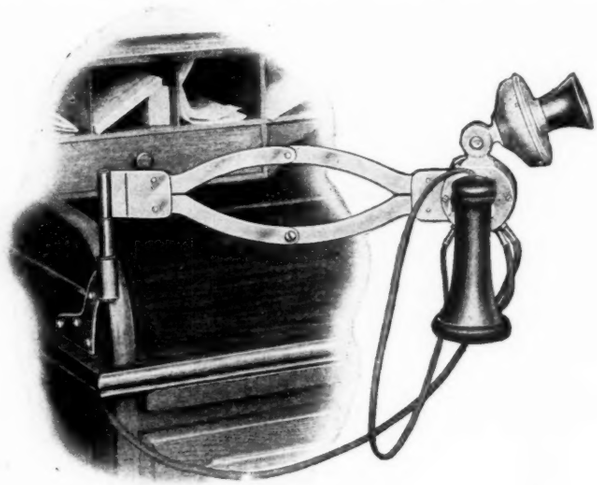


FIG. 2.

became a thing of the past, and subscriber and company welcomed it enthusiastically.

It has remained for the Chicago Writing Machine Company to combine all the desirable features of the desk set, with the saving convenience of the holder, and produce the

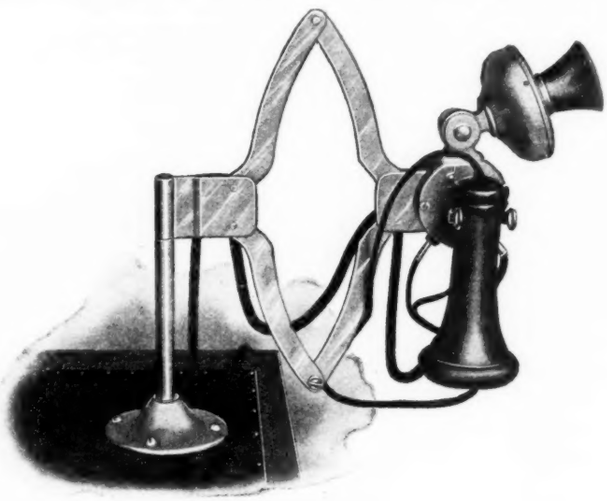


FIG. 1.

"Adjustaphone," the most radical change in form since the desk set was first designed. As shown in the accompanying illustrations, the Adjustaphone can be attached equally well to any vertically or horizontally flat surface, or to any style of desk. It is constantly at hand, ready for instant use, yet it is never in the way. It is movable in any direction with-

out any degree of effort, and, being securely attached, all danger of breakage through a fall or other accident is obviated.

The Adjustaphone is claimed to insure the telephone company against high cost of maintenance, besides providing to the subscriber the maximum of convenience in the use of the

FIG. 4.

telephone, and with absolutely no additional cost to either. It is applicable anywhere that a desk telephone is used, combining perfect adjustability with stability and being equally satisfactory for office or residence. It prevents foreign noise or jar from being directly communicated to the vital parts of the telephone and imparts sounds with exceptional clearness.

The arrangement of internal mechanism affords compactness, simplicity, durability and efficiency. By removing the

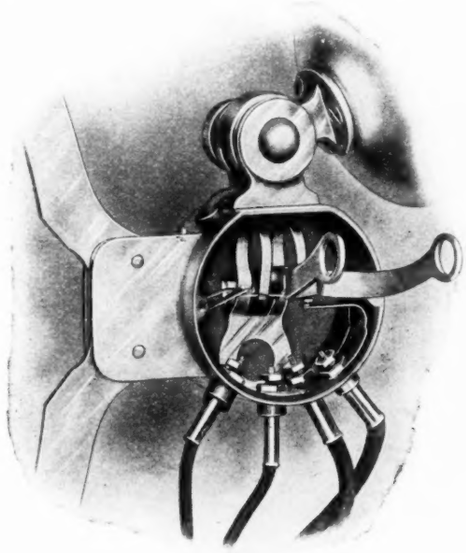


FIG. 5.

cover from the cylindrical box containing the internal mechanism, the latter is exposed to full view. The working parts are all easily accessible without removing any of them from the instrument, thus admitting of repairs, connections, adjustments or tests being made without tearing it down. The contact springs are insulated from the box by a circular strip of fibre which lines its lower portion; these springs are connected with the cord by terminals passing through metal bushings covered with vulcanized rubber sleeves to provide insulation from the box. The contact springs are held in permanent contact with the metal bushings by means of small nuts, which hold them securely in place. The cord terminals, after being inserted through these same bushings, are likewise held in place by nuts, thus providing full and durable contacts throughout. The long double curved spring controls the receiver hook, making and breaking contact with the smaller curved springs. All of these springs are made of the best German silver, and platinum points are used for all contacts. The shape of these springs and the movement given them when connection is made with the main spring, not only provides a perfect sliding contact of the most approved style, but imparts so slight a movement to the springs that their elasticity is not impaired.

The Adjustaphone can be used on any circuit for any class of service, as sufficient contacts are provided for all purposes. A four conductor cord is used for connecting up with ringer, induction coil, etc., which can be ordered with the instrument; or, if preferred, the manufacturers furnish the terminals only, to which a standard cord can be readily attached. The instrument can be used equally well with any of the standard receivers and transmitters.

Fig. 1 shows the Adjustaphone as attached to the ordinary roll-top desk, when the toggle arms are closed up. Fig. 2 shows the same instrument with the arms extended. Fig. 3 illustrates the Adjustaphone attached to a flat-top desk. The arms as shown in Figs. 1, 2 and 3 will extend the Adjustaphone about eighteen inches. In Fig. 4 the double length is shown, the arms allowing an extension of twenty-eight inches. Fig. 5 shows the box with cover removed, the working parts being fully exposed.

The neat, handsome appearance of this instrument, together with the convenience and economy which it affords, commend it to all who are interested in the telephone industry.

It is manufactured by the Chicago Writing Machine Company, 423 Wendell St., Chicago.

SUMTER INCREASES SPACE.

The Sumter Telephone Manufacturing Company, Sumter, S. C., has recently added another building to its already large establishment. The floor space of the new building adds about 20,000 square feet of floor space, nearly double the area of the former plant, and will be occupied exclusively as an assembling department and stock rooms of raw and manufactured material. The experimental laboratory and draftsman's quarters will also be located in this building.

In addition to the present line of telephone exchange instruments and switchboards several new types will soon be put on the market. The principal need of the new building, however, is to increase the present output, placing the company in better shape to meet the constantly increasing demand for its products, now so favorably known throughout a large area of the United States, Canada and Mexico.

The large plant and successful business of the Sumter Telephone Manufacturing Company is a striking evidence of the ability of its officers, Messrs. C. T. Mason, F. C. Manning and C. G. Rowland, each of whom have proven themselves well-qualified in their respective departments, where they are ably assisted by a faithful corps of employes, the entire force now fast approaching the two hundred mark. It thus affords employment to a large and constantly increasing number of persons, and as a great number of them are skilled workmen, the amount of money distributed in wages is very large.

The factory is an institution of great value to Sumter. With the addition completed it will do a larger business than ever.

OSCAR WENTWORTH ROGERS' ESTIMATE FOR TELEPHONE PLANTS IN IOWA.

ITEMS	Place Des Moines (62139) Acc't	Over 25,000, under 50,000 TOWNS Name	Popul'n	Proposed Plant Acc't	Over 10,000, under 25,000 TOWNS Name	Popul'n	Proposed Plant Acc't	Over 5,000, under 10,000 TOWNS Name	Popul'n	Proposed Plant Acc't	Over 2,000, under 5,000 TOWNS Name	Popul'n	Proposed Plant Acc't
		Dubuque	36,297		Burlington	23,301		Ft. Madison	9,278		Albia	2,889	
		Davenport	35,254		Clinton	22,698		Oskaloosa	9,212		Algona	2,911	
Business Phones	1,000	Sioux City	33,111	800	Ft. Dodge	12,162	500	Boone	8,880	250	Ames	2,422	100
Residence Phones	2,000	Council Bluffs	25,802	1,700	Keokuk	14,641	1,000	Iowa City	7,987	500	Anamosa	2,891	300
Business Rates	15	Cedar Rapids	25,656	15	Marshalltown	11,544	15	Creston	7,152	15	Belle Plaine	3,283	15
Residence Rates	10		156,120	10	Muscatine	14,073	10	Mason City	6,746	10	Bloomfield	2,105	10
Av. Length Lines	½m.			½m.	Ottumwa	18,197		Cedar Falls	5,319		Carroll	2,882	
Percentage Conduits	100			100	Waterloo	12,580	½m.	Centerville	5,256	½m.	Charlton	3,989	½m.
Connectors per 100 Subscribers						129,096	100	Oelwein	5,142		Charles City	4,227	
								Atlantic	5,046	100	Cherokee	3,865	100
									70,618		Clarinda	3,276	
											Colfax	2,053	
											Corning	2,145	
											Cresco	2,806	
											Decorah	3,246	
											Denison	2,771	
											Eagle Grove	3,557	
											Eldora	2,238	
											Emmettsburg	2,361	
											Estherville	3,227	
											Fairfield	4,689	
											Glenwood	3,040	
											Grinnell	3,860	
											Hamburg	2,079	
											Hampton	2,727	
											Harlan	2,422	
											Independence	3,656	
											Indianola	3,261	
											Iowa Falls	2,840	
											Jefferson	2,601	
											Knoxville	3,131	
											Lake City	2,703	
											La Mars	4,146	
											Manchester	2,887	
											Maquoketa	3,777	
											Marengo	2,007	
											Marion	4,102	
											Missouri Valley	4,010	
											Monticello	2,104	
											Mt. Pleasant	4,109	
											Nevada	2,472	
											New Hampton	2,339	
											Newton	3,682	
											Osage	2,734	
											Osceola	2,525	
											Pella	2,623	
											Perry	3,986	
											Red Oak	4,355	
											Sac City	2,079	
ESTIMATED COST													
Central Equipment	60,000												
Subscribers' "													
Building	5,000												
Conduits	25,000												
Armoured Cables	36,876												
Manholes	4,600												
Engineering Exps.	10,000												
Contingencies	5,000												
Distributing, &c.	36,000												
Total	$182,476			152,065			91,238			45,619			24,360
											Sheldon	2,282	
											Shanandoah	3,573	
											Spencer	3,095	
											Storm Lake	2,169	
											Speart	2,079	
											Tama	2,649	
											Tipton	2,513	
											Villisca	2,211	
											Vinton	3,199	
											Washington	4,255	
Capitalization per Phone	61			61			61				Waukon	2,153	61
											Waverly	3,177	
DEPRECIATION											Webster City	4 613	
											What Cheer	2,746	
Conduits, 3¢	3,524										Winterset	3,039	
Other Plant, 6¢	3,500											194,188	
Total	$7,124			5,940			3,562			1,781			960
EXPENSES													
Engineer and Manager	1,500												
Assistant	720												
Sec.-Tr. and Bookkeeper	900												
Storekeeper	360												
Stenographer	960												
4 Inspectors @ $80	2,880												
Heat, Light, &c	1,000												
Total	$8,320			6,950			4,160			2,750			1,500
SUMMARY													
Revenue	35,000			29,000			17,500			8,750			4,500
8¢ on Capital	14,598			12,165			7,299			3,650			1,948
Depreciation	7,124			5,940			3,562			1,781			960
Expenses	8,320			6,950			4,160			2,750			1,500
Surplus	4,628			3,945			2,479			569			92

AUTOMATIC OPERATOR—ALL LINES UNDERGROUND.

Over 1,000, under 2,000

TOWNS		Proposed Plant
Name	Popul'n	Acc't
Ackley	1,445	
Adel	1,213	
Afton	1,178	75
Akron	1,029	125
Alton	1,009	15
Audubon	1,866	10
Avoca	1,627	½m.
Bedford	1,977	
Bellevue	1,607	100
Belmond	1,234	
Britt	1,540	
Brooklyn	1,188	
Calmar	1,003	
Cascade	1,266	
Cincinnati	1,212	
Clarion	1,475	
Clear Lake	1,706	
Columbus Jct	1,099	
Coon Rapids	1,017	
Corydon	1,477	
De Witt	1,383	
Dunlap	1,355	
Dyersville	1,323	
Eddysville	1,250	
Eldon	1,850	
Elkader	1,321	
Farmington	1,332	
Fayette	1,315	
Fonda	1,180	
Forest City	1,758	
Garner	1,283	
Grand Jct	1,113	
Greene	1,192	
Greenfield	1,300	
Grundy Center	1,322	
Guthrie Center	1,193	
Guttenberg	1,620	
Hartley	1,006	
Hawarden	1,810	
Hedrick	1,035	
Humboldt	1,474	
Ida Grove	1,967	
Keosauqua	1,117	
Lake Mills	1,293	
Lamont	1,540	
Lansing	1,438	
La Porte	1,419	
Lenox	1,014	
Leon	1,905	
		12,180
Logan	1,377	
Lucas	1,132	
McGregor	1,498	
Madrid	1,021	
Malvern	1,166	
Manning	1,169	
Manson	1,424	
Mapleton	1,099	
Montezuma	1,210	
Moulton	1,430	
Mt. Ayr	1,729	61
Mt. Vernon	1,629	
Mystic	1,758	
Nashua	1,263	
New London	1,003	
New Sharon	1,252	
Nora Springs	1,269	
		480
Northwood	1,271	
Odebolt	1,432	
Onawa	1,933	
Orange City	1,457	
Parkersburg	1,164	
Rhinebeck	1,203	
Rockford	1,080	
Rock Rapids	1,776	
Rock Valley	1,054	
Rockwell City	1,222	
Sabula	1,029	
Sanborn	1,249	
Seymour	1,703	
Sibley	1,289	
Sidney	1,143	
Sigourney	1,932	
Sioux Rapids	1,005	
Spirit Lake	1,219	
State Center	1,008	
Story City	1,197	
Strawberry Pt	1,012	
Sumner	1,437	
		863
Toledo	1,941	
Traer	1,458	
Valley Jct	1,700	
Wapello	1,398	
W. Burlington	1,044	
W. Liberty	1,690	
West Union	1,935	
Williamsburg	1,100	
Wilton	1,233	
Woodbine	1,285	
	133,124	
		2,375
		975
		480
		863
		57

Over 500, under 1,000

TOWNS		Proposed Plant
Name	Popul'n	Acc't
Adair	878	
Alden	709	
Allerton	950	30
Alta	561	70
Anita	968	15
Arlington	863	10
Armstrong	907	½m.
Ashton	513	
Aurelia	621	100
Bancroft	839	
Batavia	533	
Battle Creek	542	
Beacon	953	
Birmingham	922	
Blairstown	592	
Blanchard	520	
Blockton	704	
Bonaparte	898	
Brighton	807	
Buffalo Center	875	
Burt	504	
Bussey	550	
Comanche	713	
Cambridge	667	
Carlisle	553	
Carson	632	
Casey	568	
Center Point	674	
Central City	623	
Charter Oak	772	
Churdan	626	
Clarence	675	
Clarksville	849	
Clearfield	698	
Clermont	513	
Coin	574	
College Springs	693	
Colling	540	
Correctionville	935	
Corwith	651	
Cumberland	591	
Dallas Center	625	
Davis City	617	
Dayton	753	
Delmar	592	
Delta	691	
Dexter	795	
Doon	545	
Dows	818	
		6,090
Durant	560	
Dysart	902	
Earlham	630	
Earlville	618	
Early	579	
Edgewood	565	
Elgin	635	
Elliott	516	
Elma	976	
Emerson	502	
Epworth	549	
Essex	710	
Exira	851	
Fairbank	644	
Farley	513	
Farragut	514	
Fontanelle	853	
		240
Fredericksburg	565	
Fremont	542	
Garden Grove	651	
Gilmore City	687	
Gladbrook	842	
Glidden	783	
Goldfield	628	
Gowrie	681	
Gravity	549	
Griswold	900	
Hamilton	538	
Hawkeye	518	
Hazelton	500	
Holstein	870	
Hopkinton	767	
Hubbard	676	
Hull	626	
Hunneston	945	
Ireton	545	
Jesup	690	
Jewel	947	
Kalona	530	
		400
Kellogg	653	
Keota	996	
Kingsley	720	
Lake Park	541	
Lake View	591	
Lamont	636	
Laurens	853	
Lawler	646	
Le Claire	997	
Lehigh	806	
Lewis	613	
Limesprings	605	
Linesville	690	1,150
Lisbon	956	487
Livermore	618	240
Lohrville	597	400
	42,760	23

TOWNS		Proposed Plant
Name	Popul'n	Acc't
Lone Tree	600	
Lorimer	587	
Lowden	544	30
Luverne	534	70
Manilla	773	15
Marathon	659	10
Marble Rock	573	½m.
Marcus	718	
Maxwell	810	100
Mechanicsville	703	
Mediapolis	725	
Milo	585	
Milton	849	
Mitchellville	768	
Monona	674	
Monroe	917	
Montour	502	
Montrose	748	
Moravia	632	
Morning Sun	948	
Moville	507	
Murray	949	
Neola	921	
New Albin	543	
Newell	762	
New Hartford	570	
New Market	600	
North English	683	
North McGregor	616	
Norway	533	
Oakland	913	
Ocheyedan	599	
Ogden	933	
Olin	692	
Osslan	670	
Oxford Jct	780	
Oxford	664	
Pacific Jct	732	
Panora	958	
Paulina	617	
Peterson	521	
Pleasantville	738	
Pocahontas	625	
Pomeroy	910	
Porterville	984	
Prairie City	808	
Preston	593	
Pringham	814	
Radcliffe	645	
		6,090
Redfield	509	
Romsan	855	
Riceville	804	
Richland	534	
Riverside	698	
Riverton	687	
Rockwell	830	
Rowland	577	
Rolfe	994	
Russell	636	
Ruthven	787	
Sabula	918	
St. Ansgar	698	
Salem	578	
Scranton	683	
Sheffield	688	
Shelby	692	
		240
Shell Rock	839	
Schaller	661	
Shellsburg	511	
Sioux Center	810	
Sloan	643	
Springville	599	
Sutherland	722	
Tabor	934	
Tripoli	655	
Union	589	
Vail	578	
Victor	612	
Welker	505	
Wall Lake	659	
Walnut	878	
Waucoma	540	
Wellman	654	
Wesley	730	
West Bend	538	
West Branch	647	
West Decorah	531	
West Point	654	
		400
Whiting	572	
Whittemore	522	
Williams	500	
Winfield	820	
Winthrop	618	
Woodward	550	
Wyoming	794	
	64,362	
		1,150
		487
		240
		400
		23

To the Editor of "Telephony":

I have associated with me (for the purpose of constructing plants according to this account):

Hon. Chas. A. Towne, Hon. James L. Clarkson,
Mr. Thos. C. E. Blanchard, Mr. Fred. C. Blanchard,
Mr. W. W. Blanchard, Mr. W. B. Hurlbut.
Mr. Augustine W. Wright, Consulting Engineer.
Mr. W. A. Johnson, Construction Engineer.
Mr. Fritz Loeffler, Electrical Engineer.
Mr. J. S. King, of Toronto, Ont.

We hope to have with us some Iowa men who knew my father, and who, with their like, have, on farm and in town, made Iowa what it is—men like these—
Hon. Wm. Larrabee, of Clermont.
Hon. Horace Boies, of Waterloo.
Hon. C. T. Granger, of Waukon.

The fundamental fact in this issue is the limiting of dividend to 8%. This requires an exact construction account to begin with, and a standard. That standard is, in my opinion, the "Faller Automatic Operator." There is one class of men which will settle this issue. The Farmer!

IOWA.

(Iowa Official Register)

1835—Settled by New England Emigrants.
1846—Admitted to the Union.
—Square miles of water 350
—Square miles of land 55,475
1840—Population 43,112
1900— " 2,231,853
1900— " (in towns, 42.83%) 974,845
1900— " (on farms, 57.17%) 1,257,008
1900—Families in towns 194,969
1900— " on farms 251,401

AV. VALUE FARM PROPERTY AND AV. GROSS INCOME, &c.

Acres	Land	Buildings	Machinery	Live Stock	Gr. income product 1899 not fed to live st'k
Under 3	411	673	48	141	$ 287
3 to 9	637	517	60	174	237
10 to 19	878	591	75	231	282
20 to 49	1,354	522	100	352	392
50 to 99	2,726	687	168	621	668
100 to 174	5,141	1,012	258	1,074	1,085
175 to 259	7,941	1,403	346	1,634	1,594
260 to 499	11,891	1,806	440	2,656	2,228
500 to 999	21,661	2,689	584	6,185	4,200
1000 & over	47,085	5,850	1,038	15,413	9,019
The State	5,497	1,053	253	1,220	$1,152

Principal Source of Income	No. of Farms	No. of Acres in Farms	Value of farm Property
Hay and grain	73,120	11,536,343	$573,063,756
Vegetables	2,136	85,320	7,437,889
Fruit	852	31,926	3,519,932
Live Stock	133,625	21,133,392	1,151,548,425
Dairy Produce	7,678	860,049	49,635,804
Tobacco	2	110	8,669
Sugar	35	4,049	325,848
Flowers—Plants	97	669	646,435
Nursery Products	104	6,285	866,788
Miscellaneous	10,883	916,194	47,292,000
The State	228,622	34,574,337	$1,834,345,546

TELEPHONE MILEAGE IN IOWA

(Iowa Official Register)

Bell (Iowa Telephone Company) $6,271.88
Independents 15,428.83

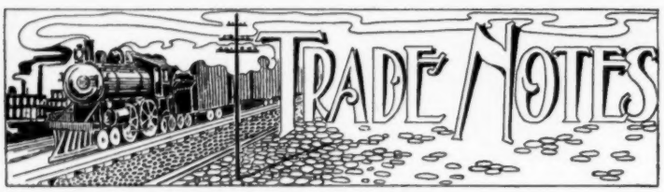
The Independents have more mileage than have the Bell Company. Western Union Telegraph Co. and C., B. & Q. R. R. Co., Postal Telegraph Co., C., M. & St. P. R. R. Co. and Western Electric Telephone Co. all together.

OUR PROPOSITION

No. of Towns	Population	Phones	Cost
1 Town	62,139	3,000	$182,476
5 "	156,120	2,500	660,325
8 "	129,096	1,500	729,904
10 "	70,618	750	456,190
64 "	194,188	400	1,579,040
98 "	133,124	200	1,193,640
199 "	107,122	100	1,211,910
385	852,407	100,100	$6,013,485

In a few years each Iowa family will have a phone. Nothing can stop it. The rates will be less than $15 and $10.

OSCAR WENTWORTH ROGERS.



THE VOUGHT-BERGER COMPANY, La Crosse, Wis., is mailing a folder under the unique title of "Number Forty-Five." It refers to the company's new magneto telephone, which it illustrates and describes.

THE F. BISSELL COMPANY, Toledo, Ohio, gives in a recent folder an illustrated list of its specialties, including an automatic portable hand lamp, pole platforms and seats, cable cars, trolley and line fittings.

MANHATTAN ELECTRICAL SUPPLY COMPANY, New York and Chicago, has recently issued its price supplement No. 2, with corrections applying to trade price list "B." This supplement may be had by addressing the company.

HIPWELL MANUFACTURING COMPANY, Allegheny, Pa., is mailing a set of interesting and instructive pamphlets and advertising novelties which are unique. The company will be pleased to send the entire set to any one upon request.

THE STROMBERG-CARLSON TELEPHONE MANUFACTURING COMPANY, Rochester, N. Y., and Chicago, has recently sold a 140 capacity generator call switchboard with fifty three drops installed to the Schooler Brothers' Telephone Company, Antlers, I. T.

N. T. HUNGERFORD BRASS AND COPPER COMPANY, 121 Worth street, New York, is calling attention to its high-grade copper anodes. A card showing the company's specialties will be sent upon request, together with full descriptions and prices.

WM. ROCHE, manufacturer of the New Standard dry battery, has recently been compelled to enlarge his plant, owing to the constantly increasing demand for his product. Mr. Roche reports the most successful season he has experienced since his start in business.

STANDARD TELEPHONE AND ELECTRIC COMPANY, Madison, Wis., reports that owing to the increased business of the company, its factory space has recently been greatly enlarged and several thousand dollars worth of new and improved machinery has been installed.

THE EMPIRE ELECTRICAL SUPPLY COMPANY, Chicago, has just been incorporated with a capital stock of $10,000. This company will manufacture and deal in electrical and telephone devices. The incorporators are C. W. Farr, A. N. Barothy and C. L. Hibbard.

THE CHASE-SHAWMUT COMPANY, Boston, Mass., has purchased a large factory at Newburyport, Mass., which will be used for manufacturing the company's specialties. The present factory at 390 Atlantic Avenue, Boston, will be used for office purposes and as salesrooms.

EUREKA TELEPHONE.—One of the handsomest telephone catalogues that we have thus far seen is that recently issued by the Eureka Electric Company (No. 23). The seventy pages are printed on half-tone paper of the finest quality and the illustrations are excellent examples of the best grade of half-tone work. The stamped cover indicates how an excellent effect may be produced with the absence of any color. The catalogue contains little short of 100 excellent illustrations showing the long line of telephonic apparatus manufactured by this company, which includes everything in telephonic installations from the smallest detail up to exchange switchboards.

THE STANDARD TELEPHONE & ELECTRIC COMPANY, Madison, Wis., reports an ever increasing demand for its telephone apparatus. The many improvements this company has made in its product have placed it well up among the manufacturers of high-grade Independent telephone equipment.

ILLINOIS ELECTRIC COMPANY, Chicago, is sending to telephone exchanges a booklet describing the Pierce electric construction specialties. The booklet is fully illustrated. The company is also calling attention to its other specialties in a set of leaflets. All of which will be sent free upon request.

THE CLIMAX ELECTRICAL SUPPLY AND CONSTRUCTION COMPANY, Bluefield, W. Va., has been granted a charter with a capital of $10,000. The company will buy and sell all kinds of electrical supplies. W. P. Hawley, P. M. Walizer, R. S. Jones, T. A. Martin and W. A. Panke are the incorporators.

ATWATER KENT MANUFACTURING WORKS, Philadelphia, Pa., is sending to the trade a calender which is attractive and handy. The company calls attention to its new automatic volt ammeter which is meeting with considerable favor. Descriptive matter of the company's product will be mailed upon request.

STROMBERG-CARLSON TELEPHONE MANUFACTURING COMPANY, Rochester and Chicago, recently closed a contract with the Benson Telephone Company, Benson, Minn., and the Red River Valley Telephone Company of North Dakota for one of its 400-line capacity generator call visual signal switchboards.

MICHIGAN WHITE CEDAR, a story in two chapters, is the title of a booklet that the Maltby Lumber Company of Bay City, Michigan, are sending out to all its customers. There is considerable information and some rather instructive pictures contained in the folder, which the company will be glad to send upon request.

THE SIGNALPHONE COMPANY, Milwaukee, Wis., is sending to the trade a series of attractive bulletins, illustrating and describing the company's product. Bulletins number 18, 19, 20 and 21 are the latest issued and show Signalphone police patrol and fire alarm apparatus. The company will send the complete series of bulletins upon request.

STROMBERG-CARLSON TELEPHONE MANUFACTURING COMPANY, Rochester, N. Y., and Chicago, has issued a little booklet on its intercommunicating systems, "With a telephone at your right hand, your department's at your command," is the couplet on the front cover. The booklet is of interest to those contemplating the installation of private systems.

ELECTRIC APPLIANCE COMPANY.—The general supply catalogue No. 20 is just from the press of the Electric Appliance Company, Chicago. This catalogue is a most attractive one in appearance and in completeness and arrangement is fully up to the standard of others issued by this hustling house. It lists many new articles never before shown in a supply catalogue and all out-of-date items have been eliminated. This large volume with the loose leaf discount book accompanying it should be in the hands of every electrical buyer. The company will take pleasure in send-

ing a copy by prepaid express to any one in the trade who has been overlooked in the distribution.

THE HYDRA BATTERY COMPANY, 70-72 Reade street, New York, is mailing to the trade a little booklet on "Hydra" batteries. A folder accompanies the booklet which contains some important points in connection with the company's product. The company invites correspondence from prospective purchasers and will be glad to furnish descriptive matter upon request.

THE SWEDISH-AMERICAN TELEPHONE COMPANY, Chicago has recently closed contracts for the complete equipment of the following companies: Macy Telephone Company, Macy, Ind., Garber Telephone Company, Garber, Okla., Clinton County Telephone Company, Perrin, Mo., Ney Telephone Exchange, Sherwood, Ohio, and Gibsonburg Telephone Company, Bettsville, Ohio.

THE INTERNATIONAL TELEPHONE MANUFACTURING COMPANY, Chicago, which has for the past two years been installing a large number of successful multiple switchboard central energy systems, is having equal success with its new line of generator-call switchboard apparatus and generator-call telephones. Among its recent orders was one for a complete public exchange outfit for E. A. Schuman, Jacksonville, Fla.

FARR TELEPHONE AND CONSTRUCTION COMPANY, Chicago, is circularizing the trade with a proposition that should interest the buyer. With each order for two telephones the company gives away a set of books for the keeping of records and other details of a telephone office. The books are of the modern labor-saving order and are a useful adjunct to an exchange. The special proposition will be mailed to any one upon request.

HART AND COMPANY, Chicago, announce that they have taken the general sales agency for the Tornquist combination lightning arrester, ground switch, fuse and lever cut-out. The demand for this cut-out has been so great that the company has been compelled to enlarge its factory to double its former size. All orders will now receive prompt attention, and the company invites correspondence from prospective buyers.

THE JOHN M. KLEIN ELECTRICAL WORKS, San Francisco, Cal., will remove on October 1 to a four-story building at 107 Battery street, one block from Market street, which is the center of the wholesale district. The building is 40 feet by 125 feet and is well adapted for this business. The removal of this works to these large quarters is a consequence of its growth. Mr. Klein has the largest electrical establishment on the coast.

THE CROUSE-HINDS ELECTRIC COMPANY, Syracuse, N. Y., is marketing a fine line of "Norbitt" electric specialties. These "Norbitt" porcelains are well known to the electrical trade, and eastern visitors are invited to inquire at the New York office, 23 Dey street, where a full stock is carried. A new catalogue which has just been issued by the company will give a good idea of the extensive line covered by the "Norbitt" specialties, and this will be sent upon request.

THE SWEDISH-AMERICAN TELEPHONE COMPANY, Chicago, reports that the selective signalling apparatus it recently put on the market is meeting with universal favor among exchanges and those using this class of apparatus. The simplicity of these instruments is the keynote of their success, being constructed on such lines as to not require the services of an electrical engineer to properly install and maintain them. The complications of numerous springs, mysteriously wound coils and triggers are obviated, claiming to thus insure the user satisfactory service and the operator a low cost of maintenance. Full and complete information will be furnished to those interested.

ELECTRO MAGNETS is the title of a very handsome catalogue recently issued by the Varley Duplex Magnet Company of Providence, R. I. The cover is attractively printed in colors and the catalogue covers electro magnets and all kinds of coil windings of insulated and bare wire. It is profusely illustrated and contains a number of diagrams and tables, besides a complete line of coils and machinery. The book is of considerable value and will be sent free to those mentioning this publication.

THE AUTOMATIC ELECTRIC COMPANY, Chicago, Ill., reports that it is now installing the following plants with the Strowger automatic telephone apparatus: Citizens' Telephone Company, Grand Rapids, Mich., 5,000 stations; Northeastern Telephone Company, Portland, Maine, 2,500 stations; St. Mary's Telephone Company, St. Marys, Ohio, 500 stations; Cleburne Telephone Company, Cleburne, Texas, 640 stations; Southern Telephone Construction Company, Columbus, Ga., 700 stations; University of Illinois, Urbana, Ill., 50 stations; University of Chicago, 50 stations; Armour Packing Company, St. Louis, Mo., 45 stations; Union Telephone Company, Woodstock, New Brunswick, Canada, 110 stations. All of these equipments will be in operation within a few weeks.

AMERICAN CONDUIT MANUFACTURING COMPANY, New Kensington, Pa., has sent out the following notice:

"We take pleasure in informing the trade that although the American Conduit Manufacturing Company has been sued for alleged infringement of alleged patent process, by the Safety Armorite Conduit Company, the courts will decide the case, and not the Safety Armorite Conduit Company.

"Our process is new, and we so inform the trade.

"Bluff does not go with us, and we are still doing business at the old stand, and expect from present indications to more than double our volume of business, which at the present time is certainly very encouraging.

"Thanking you for past patronage and soliciting your future favors, we are, American Conduit Manufacturing Co

THE MARION INSULATED WIRE & RUBBER COMPANY, Marion, Ind., has now well under way its new factory for the manufacture of rubber-covered wires and cables. It will make a full line of such goods, including telegraph and telephone cables, and lead-incased varieties. The factory building is 224x60 feet, three stories and basement, 150x60 feet, with an L 100x40 feet, two stories. The mills and washers will be direct-connected to a 450-horsepower Corliss engine, and all other machinery will be driven by electric motors, with current from the factory plant. Not anticipating any unusual delay, the management expects to be in operation by November. The officers are: J. L. Barley, president; C. A. Michaels, vice-president; Hiram Beshore, treasurer, and R. E. Lucas, secretary and general manager. The latter is well known in the electrical field as being for the past eight years secretary of the Indiana Rubber & Insulated Wire Company at Jonesboro, Ind. President Barley is the president and manager of the Barley-Spencer Lumber Company, and is associated with a large number of manufacturing enterprises at Marion. Mr. Michaels is also connected with numerous enterprises, is proprietor of the Union Cabinet Company, and is largely interested in the local electric light plant. Mr. Beshore is connected with the Grant Trust and Savings Company. The list of stockholders is not a long one, those on it being all well-to-do people.

THE MILLER'S ANCHOR.

The Miller anchor for guying poles is coming into marked favor among construction men and exchange managers, as possessing features of distinct merit. It is claimed by the manufacturers that any rod connected to the anchor will break before the anchor is dislodged. In Fig. 1 is shown the Miller anchor in position to go into the ground. Fig. 2 shows the position of the anchor after it is set, and the strain is put on. The anchor can be set on the finest lawn by

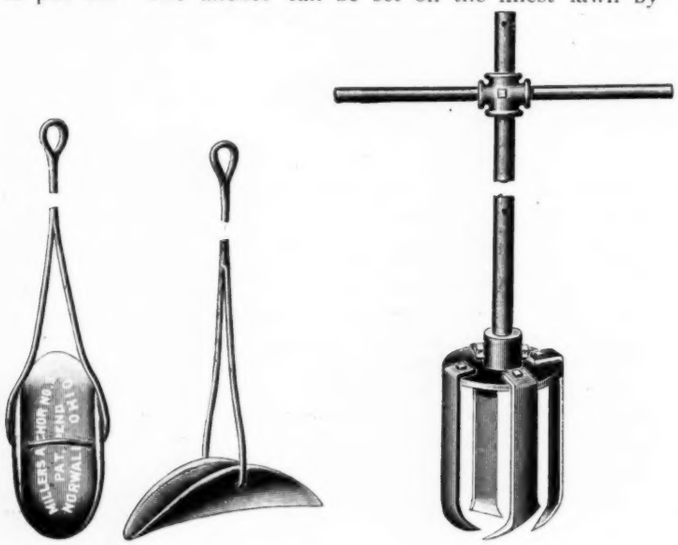


FIG. 1. FIG. 2. FIG. 3.

removing only twelve square inches of sod. It is made of cast iron and will last a lifetime.

The Miller auger for setting the anchor is shown in Fig. 3. It is made in different sizes. The auger with a seven-foot stem will set a number 2 anchor. The combination auger has an eight-foot stem, one inch in diameter, fitted with two boring heads, the small one for the number 2 anchor, the large one with adjustable blades for the number

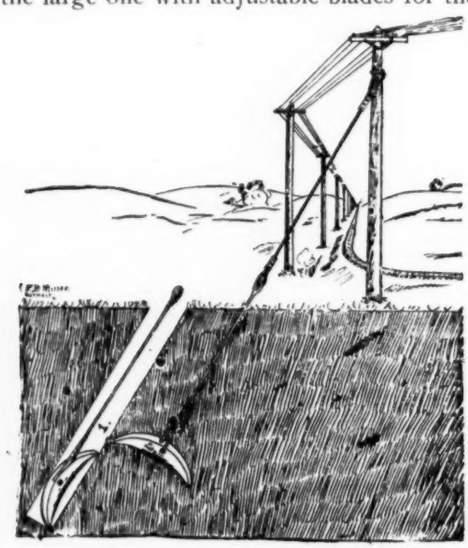


FIG. 4.

3 and 4 anchor. All augers have adjustable handles, as the auger enters the ground the handle can be moved up the stem.

In Fig. 4 is shown the anchor in actual practice. The illustration shows the method of setting the anchor, also the anchor set with the line strain upon it. It will be seen that the hole was first bored with the Miller auger, then the anchor slipped down to the bottom, after which the hole was filled and tamped and the strain put on. The Miller excavating bucket shown in Fig. 5 is something new in this line and is claimed to be a great time saver to hole diggers. It is made of galvanized iron, is fourteen inches deep and eight inches in diameter; has rope and anchor pin attached. With this bucket almost a solid foot of earth can be removed

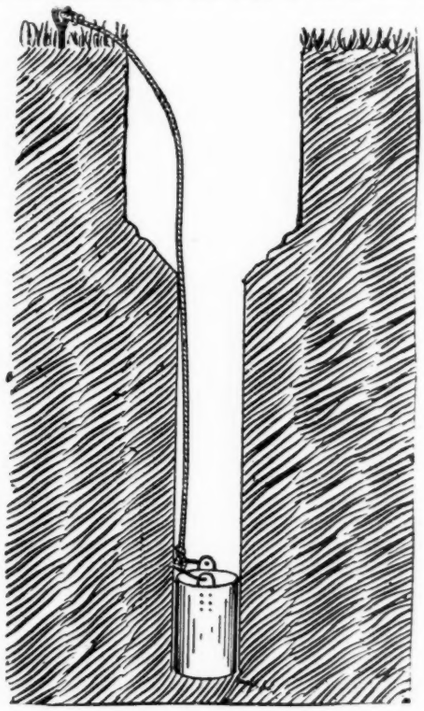


FIG. 5.

at one time. The Miller Anchor Company, Norwalk, Ohio, will be glad to furnish descriptive matter and prices on its product and invites correspondence from exchange managers and constructive companies.

A VICTORY FOR THE TELEPHONE.

One of the fiercest fights that has ever been put up for telegraphy against the rapid advancement of telephony has recently been decided in favor of the latter in the adoption by the city of Cleveland, Ohio, of a complete new police signaling equipment, based on the telephone instruments to replace the system with a telegraph instrument on a circuit line construction as its main equipment.

Previous to the development of Independent telephony practically all police signal equipment employed the telegraph circuit system for reporting and signaling to the central office from the patrol boxes. These circuit telegraph signal systems having had practically the monopoly in police department equipment, the first specifications asking for bids for an equipment for the Cleveland police department were drawn so as to prevent receiving bids or considering the more modern system based on telephony with telephone construction. Proposals on the original specifications were received three years ago and a contract practically closed for the old form system, but the bids were thrown out on account of a technicality.

At the beginning of Mayor Tom L. Johnson's administration the entire matter was readvertised, calling for bids under specifications allowing free and open competition. Proposals were received for the various styles of systems and all known equipment was thoroughly investigated by special committees and experts, as well as by Mayor Johnson and other city officials personally, and after a most

thorough investigation the city reversed its decision under the original bids and contracted for a complete equipment of the new police signaling and telephone system, based on the telephone instrument, being put on the market by the Municipal Signal Company of Chicago and manufactured exclusively for it under the Cregier patents by the International Telephone Manufacturing Company, Chicago. The system adopted was invented and patented by N. Banks Cregier of Chicago in 1891, but owing to its having the telephone as one of its main features, prevented its being put on the market at that time. The Cleveland contract comprises nine combined operating desks, call indicating and connecting switchboards complete, with power boards, power plants and all other necessary central office apparatus pertaining to the electrical equipment, together with 200 weather-proof street patrol boxes, the contract in all amounting to nearly $30,000.

In the face of each board is placed a map of the district for which it is intended, in which is mounted line lamp signals for each patrol box, showing the exact location of the box. The map also shows the fire boxes and engine houses and the principal buildings or important points in the district. The board is also provided with special indicators for an emergency or wagon call signal, together with keys for conveniently cutting in the operator's set or ringing generator, with regular line lamp signals, answering jacks, proper answering, ringing and connecting appliances, and also a complete operator's telephone set in duplicate.

The patrol boxes contain a complete telephone equipment for giving a regular reporting signal to the office; also a distinct emergency or wagon call signal, a bell for an answer back signal, a heavy compound ringer with large gong for a patrolman's recall signal, cut-out switch, and proper protectors, all mounted in a heavy iron weather-proof protection box. The system is arranged for giving two separate and distinct signals from the patrol box to the central office; two separate and distinct signals from the central office to the patrol box, as well as complete telephone equipment for oral communication between any of the boxes or any points of the system. It is a full central energy system requiring no local batteries or parts subject to deterioration at the box. Each patrol box is connected directly with the central office, avoiding all possible chance of mistakes in signaling or reporting.

While this system has been installed in a number of our largest cities, among which are the extensions to the Chicago system in 1899, the entire city of St. Paul, replacing the less modern system several years ago and having been adopted and used by the Pan-American Exposition for its police department use during the fair, the system at Cleveland will be watched with considerable interest, as it embodies many new features and improvements in its construction and will be equipped with the International telephones.

The old form telegraph system being always designed to work in connection with the Bell exchanges, the adoption of this system, which is arranged for connecting with the Independent exchanges, means also a victory for the Independents over the Bell.

BULLETIN NUMBER 6 AND 7.

The above is the title of the Stromberg-Carlson Telephone Manufacturing Company's new catalogue on generator call switchboards and parts. The book is most attractively gotten up. The loose leaf system is used, which is rapidly coming into favor among up-to-date advertisers. An innovation in these bulletins is the diagrams of switchboards drawn to scale and giving all necessary details and measurements. The section devoted to switchboard parts and protective apparatus is very complete. The bulletins will be mailed free upon request to the company's Rochester or Chicago office.

ANNOUNCEMENT.

The Wesco Supply Company, St. Louis, Mo., recently sent out an announcement that it has acquired the merchandise and good will of the supply business of the Western Electric Supply Company, and will continue to carry on the business at the same address, Seventh street and Clark avenue. The Wesco company has a largely increased capital and intend to carry the largest and most complete stock of telephone and electrical supplies and construction material in the United States. The announcement is signed by the new company's vice-president and general manager, R. V. Scudder, who has devoted a great many years to the business and who is widely known in the telephone and electrical field. Mr. Scudder promises many things for the new company and takes occasion to thank those who have favored his company with their patronage. He solicits the telephone and electrical buyers' continued good will and assures patrons that their orders will receive careful consideration.

The Western Electrical Supply Company, Seventh street and Clark avenue, St. Louis, will continue in business, but will be devoted to electric railway and large central station apparatus. The following announcement concerning this company has been sent out, signed by H. K. Gilman, president:

St. Louis, Sept. 1st, 1903.

We take pleasure in announcing to you the fact that owing to the constant growth of our business during the past ten years, we have found it advisable to increase our cash capital and divide our business into two parts.

That portion of our business relating to electrical supplies and its good will and stock of goods, we have sold to the Wesco Supply Company, just organized, with ample capital to continue that business, under the personal management of R. V. Scudder. The Wesco Supply Company has a large cash capital, and pays us cash for all merchandise and a bonus for good will.

The other part of our business, the building of electric light plants and electric railroads, will be retained by ourselves, and we will hereafter restrict ourselves to this branch of our business, and now have on hand contracts calling for orders for nearly a million dollars in this department.

All liabilities of the company will be liquidated by ourselves. We expect shortly to increase the capital to three hundred thousand dollars, and will discount all future purchases. The company will continue to be personally managed by H. K. Gilman, with offices at Chemical building, St. Louis, Mo. H. K. Gillman of the Western Electrical Supply Company will retain an interest in the Wesco Supply Company and will serve as one of its directors.

Both companies will be officered by old employes of the Western Electrical Supply Company, and with ample cash and better facilities than ever before, will undoubtedly continue the record of success made by the old concern.

We bespeak your cordial support for both companies.

WESTERN ELECTRICAL SUPPLY COMPANY.

THE RURAL TELEPHONE.

The above heading is the title of a book just issued by the advertising department of the North Electric Company of Cleveland, Ohio. This department is in charge of F. F. Sapp, who has done so much to make the North Electric Company's apparatus known to telephone buyers. In the present book Mr. Sapp shows his best work and the production is something both he and his company may be proud of. The book is one of the finest examples of its kind we have ever seen. The cover is very elaborate, being finely embossed with an original photograph attached in a panel. The illustrations are of the highest order of excel-

lence, and typographically the book is perfect. The reading matter covers the rural telephone in a comprehensive manner. Especially valuable is that section of the book devoted to construction. The price of the book is twenty-five cents, and it is procurable by coupon. A limited number will be sent out to readers of TELEPHONY who make immediate application and mention this journal. Send your requests to Advertising Department, North Electric Company, Cleveland, Ohio.

INDEPENDENT GROWTH IN CANADA.

The two Independent telephone exchanges installed at Port Arthur and Fort William, Ontario, a little more than a year ago, have had probably the most marvelous growths of any plants in Independent telephony in face of the most adverse and unfavorable conditions. After the exchanges had been well established, it was learned that owing to the contract by the "Anti-public Bell-railway compact," the railroad companies refused the installation of any instruments excepting those of the Bell company. In addition to this disadvantage, the Fort William exchange was completely destroyed by fire this spring. The exchange, however, was rebuilt immediately, notwithstanding the extraordinary efforts on the part of the Bell company to either buy the systems or in any other way prevent its re-establishment.

While the municipal plants already have practically twice as many subscribers as the highest number the Bell company ever had previous to the opening of the municipal exchanges, both municipalities have recently contracted with the International Telephone Manufacturing Company of Chicago, the manufacturers of the equipment first installed, for additions of a section to each of the central office equipments. The success of the Independent systems is clearly shown from the fact of the marvelous increase beyond all expectations and having succeeded in leaving the Bell company without any subscribers whatever excepting the free or exchange instruments which they are required to maintain in the railroad offices under their "Anti-public Bell-railway compact" contract.

NORTH ELECTRIC COMPANY FIELD DAY.

The employees of the North Electric Company, Cleveland, Ohio, held their annual field day and picnic at Silver Lake, Ohio, on September 12, 1903. The program, which covered all manner of sport, was carried out as announced with the exception that George C. Steele's position as starter was taken by the company's advertising manager, F. F. Sapp, Mr. Steele being indisposed. The day's sport was opened by a baseball game between the Polar Bears and the North Stars, Mr. Northphone acting as umpire. The game was won by the Polar Bears, who were given a silver cup as a trophy, which is a challenge trophy and is to be contested for each year. The outing party was taken to Silver Lake on a special train of ten coaches, and the day was most pleasantly spent.

A STRIKING CATALOGUE.

One of the most striking catalogues which have come to this office is the one entitled "Fuse," issued by the American Electric Fuse Company of Chicago, New York and Atlanta. The catalogue, which is printed in colors, is the work of Frank G. Jones, president of the company, and mirrors that originality which has made him a conspicuous and prominent figure in the Independent telephone field. The catalogue shows the company's complete line of protective apparatus and gives a great deal of practical information on this important part of telephone equipment. It would take too much space to review the catalogue in full. The index occupies two pages which gives some idea of the size and scope of the book. The American Electric Fuse Company will send the catalogue prepaid to any address upon application and invites correspondence from prospective buyers.

COMMERCIAL VALUE OF CLARK APPARATUS.

The commercial value of wireless telegraphy was demonstrated and its practical features were brought to the attention of many thousands of people who attended the Michigan state fair recently held at Pontiac.

The Thos. E. Clark Wireless Telegraph-Telephone Company had two stations located on the grounds and in charge of operators, who were kept busy sending and receiving the three thousand messages to private parties, heads of departments, officers, judges of the fair and city by the "Junior type" Clark instruments operated with dry batteries which supplied the current to the transformer. The high efficiency and positive accuracy of messages sent and received was the testimonial of many of the most prominent men of Michigan and numerous other states. A feature of this system is the rapid manner in which it was installed, with complete equipment for immediate service, also the equally dexterous manner in which the stations were dismantled and transported to other sections of the country after the fair was over.

There has been much perfecting in this branch of electrical phenomena and the future possibilities are vast.

JUDGE ANDERSON'S DECISION.

Judge Anderson of the Federal court at Indianapolis has rendered a decision in the Sterling Electric Company litigation. It is alleged that the president of the company refused to answer certain questions in the inquiry before a master some weeks ago, and Judge Anderson was appealed to. The ruling was that the company, through its president, must answer. The hearing will be resumed before the master.

In the previous proceeding, it is further alleged, there was no dispute that a verbal contract had existed between Frank B. Cook and the officers of the Sterling Electric Company by which Mr. Cook retained his title to the patents which he was using in the Sterling works; but it had been denied that there was any written contract to that effect. The question Mr. Doolittle declined to answer was as to the existence of the written contract which would protect the inventor. Judge Anderson's ruling would seem to increase Mr. Cook's chances to retain ownership of the devices.

The Sterling Electric Company has two more weeks in which to close its side of the case. Mr. Cook, after that date, has thirty days for answer, and the Sterling Electric Company fifteen more days for rebuttal. The hearing will be resumed in Lafayette.

Mr. Cook was the first president of the Sterling Electric Company when the establishment located in Lafayette. He had long employed his inventive faculty in devising new inventions of use in the work of the factory. He was paid a salary and was a large stockholder in the concern. When he severed his connection with the company a dispute regarding the Cook patents followed, and this litigation is the result of that dispute. Mr. Cook claims that he had a written contract by which he remained owner of the new patents, and entitled to compensation for the Sterling Electric Company's use of them.—*Lafayette Democrat.*

A little bird sat on a telephone wire,
And said to his mates, "I declare,
If wireless telephony comes into vogue
We'll all have to sit on the air."